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DEPARTMENT OF DEFENSE
DEFENSE SYSTEMS MANAGEMENT COLLEGE
FORT BELVOIR, VIRGINIA 22060-5426

DSS Directorate

MEMORANDUM FOR: CAPPS 2.20 User

SUBJECT: Program Manager's Support System (PMSS) Module

1. Attached is a copy of the Defense Systems Management College (DSMC) software module called Contract Appraisal System Module (CAPPS), Version 2.20.

2. This module runs on the IBM PC/XT/AT, Zenith Z-248 or a true compatible, using PC-DOS/MS-DOS Version 3.1 or higher.

3. Please use, test and evaluate this software module and documentation. We would appreciate it if you would send us your comments and suggestions. For your convenience in doing this, we have enclosed a pre-addressed, postage paid "Comment and Report Form" in the back pocket of this binder.

4. Your inputs will be used to refine the module and documentation. Your efforts in this regard will be of great help to all program management offices and to the Defense Systems Management College. Thank you for your interest in this project.

5. Please send your responses to the Defense Systems Management College, ATTN: Ms. Helen Haltzel, (DRI-S), Fort Belvoir, Virginia 22060-5426. The telephone number is commercial (703) 780-1850 or AUTOVON 354-5783.

Sincerely,

Helen Haltzel

Helen Haltzel
Manager
DSMC Software Distribution Center

D1.95:

Contract Appraisal System

(CAPPS)

Version 2.20

Developed by
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Prepared for
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Fort Belvoir, Virginia 22060-5426

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FORWARD

The Program Manager's Support System (PMSS) is a program to develop government management tools to aid acquisition executives and managers in their decision-making processes.

The PMSS program consists of an integrated software program and individual functional modules. Functional modules may be of three types: 1) an executive's or senior-level manager's model, 2) an analyst's tool model, or 3) both models in the same module.

An executive's or senior level manager's model is intended and designed to support the executive or manager with high level, summarized information that is required for the decision-making process. The high level information may be presented in qualitative or quantitative terms as appropriate.

An analyst's tool model is a detailed model that has all the details necessary for an analyst to do an appropriate analytical job. The information in this type model would be in quantitative terms.

Some types of executive or senior-level manager models require the inclusion of detailed information as a baseline from which to extract and summarize high level information for decision- making. In these cases, it is appropriate to include both levels of models in the module.

The CAPPS module incorporates enhanced analyst capabilities into the executive manager's module.

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Section 1. INTRODUCTION

1.1 Performance Measurement

The discipline of contractor performance measurement, designed as a method for program managers to keep abreast of and quantify project contract status, was introduced in the Department of Defense in the late 1960s. Since that time, its conceptual foundations have held firm and its use has been expanded to other government agencies such as the Departments of Energy, Transportation, and NASA.

For a program manager, the process of performance measurement provides regular information about how things are going on a particular contract. This information is generated out of the system which the contractor utilizes for management of the project so the program manager is operating with the same aggregate data as the contractor's managers. Obviously, the program manager does not have access to the important insights obtained from day-to-day involvement. However, proper performance measurement system design ensures that the aggregated performance data is based on and thus reflects the small pieces of work that are being accomplished on a daily basis.

The central theory of performance measurement is that, in order to obtain an objective measure of how a contractor is doing, actual costs for a period of time should be compared to the value of the work which was accomplished during that same period, not to the amount of money that was planned to be spent. This type of comparison integrates the essential evaluation of work which has been done with information on the funds which have been expended.

1.2 Contract Appraisal System (CAPPS)

The software program which you are learning to use has been designed to assist you, as a program manager, with analysis of the performance data presented by your contractors. This data is routinely reported to you by contractors with cost-type contracts. CAPPS easily accommodates any work breakdown structure (WBS) or functional organization required by a project or requested by a contractor.

CAPPS emphasizes bottom-line analysis. Utilizing the default path, you only need to press the "return" key to see the status screens which provide a textual explanation of the six WBS or functional elements which

are causing the largest problems within a project. There is an option which permits you to look only at the lowest level elements if you desire. This option prevents a "parent" and "child" element from both appearing as contributors to the set of six elements. These status screens give you a concise summary of what has been happening and what might happen if trends continue without immersing you in all the details.

If you want to get a more detailed explanation on any specific element, you may choose from a variety of graphic presentations which explore the data trends.

CAPPS provides an extensive on-line User Assistance function (Help and Explain) which will help you solve most of the problems you encounter operating the module or understanding the performance measurement terms. Exploring the User Assistance system is one of the best ways to quickly become familiar with the many analytical insights CAPPS offers. Appendix B provides a comprehensive guide to assist the user. In addition, the Tabular version of CAPPS is presented in Appendix E.

1.3 How to Use this Manual

This manual has been prepared with four levels of user knowledge in mind. The first user is unfamiliar with both performance measurement and microcomputers. The second is unfamiliar with performance measurement but knows something about microcomputers. The third is conversant in performance measurement but is inexperienced in the use of microcomputers. The fourth user is familiar with both performance measurement and microcomputers. These user types are depicted in the chart below.

Area of Knowledge	**User Type 1**	**User Type 2**	**User Type 3**	**User Type 4**
Performance Measurement	low	low	high	high
Micro-Computers	low	high	low	high

Depending on the type of user you are, you will find a couple of different reference points which will help you in finding answers to your questions as you use CAPPS. As a general rule, the parts of this User's Manual which require you to sit down at the computer and press keys are explained in three ways:

WHAT TO DO - a description of the activity or interaction required on your part;

HOW TO DO IT - concise instructions of what to do with the keypad, the diskettes, the printer;

WHY DO IT? - a brief description of the particular usefulness of the analysis you have ordered by following the sequence in the "how to do it" stage.

A user type 1 will want to follow the step-by-step process through the manual beginning with the sections on the hardware and software requirements and getting started, continuing through detailed instruction on running the program, and ending with data base utilities. User types 2 and 3 may also follow the step-by-step approach concentrating, as appropriate to their level of knowledge, on either the "how" or "why" part of the explanation. A user type 4 will probably only need to follow the "fast track" instructions (Section 7) a few times to become thoroughly familiar with CAPPS.

All frequent users will eventually approach type 4. As this happens, more reliance will be placed on the reference tables found in the Appendices of this manual and in the User Assistance function.

The purpose of the User's Manual is to help you in the beginning stages of your relationship with CAPPS. Hopefully, after you become comfortable with the computer and performance measurement, the User Assistance function will answer your questions regarding what to do and how to do it, and will provide you with a refresher on why a particular step is necessary or useful in your analysis of performance data.

The following topics are covered in the remainder of this manual:

- Section 2 gives a description of the performance measurement process.

- Section 3 gives an overview of the CAPPS module including its structure.

- Section 4 gives a description of the system requirements, including compatibility.

- Section 5 contains information on the keyboard/controls, making a back-up copy, installing on a hard disk, helpful hints, limitations, and starting the program.

- Section 6 provides detailed instructions on running the program.

- Section 7 contains fast track instructions for the experienced user.

- Section 8 contains information regarding the format of the program output.

- Section 9 provides instructions for entering and updating the data.

- The Appendices provide information on the rules used in CAPPS, user assistance topics, performance measurement references, error routines, Tabular CAPPS, and automated data submission.

Section 2. THE PERFORMANCE MEASUREMENT PROCESS

As a program manager, a large part of your responsibility involves keeping track of how well the contractors working on your program are accomplishing their cost, schedule, and technical objectives. The process of performance measurement facilitates this tracking by stipulating rules for the establishment of a baseline plan against which actual work accomplishment is measured. Progress against this plan is reported regularly and changes to the baseline are carefully controlled and monitored so the measurement of work performance is not distorted.

The rules set forth by the Department of Defense for performance measurement are applicable to contracts of specified types, dollar amounts, and durations. Generally, contracts and subcontracts within major system acquisition programs must comply with the most stringent requirements. The objective is to ensure competent contractor management practices and protect the Government from risk associated with high dollar, long duration, cost-type contracts.

Specific guidance on the parameters, content, and reporting requirements associated with performance measurement systems is contained in: DoD Instruction 7000.2, Performance Measurement for Selected Acquisitions; DoD Instruction 7000.10, Contract Cost Performance, Funds Status, and Cost/Schedule Status Reports; and the Cost/Schedule Control Systems Criteria Joint Implementation Guide.

DoD Instruction 7000.2 outlines the Cost/Schedule Control Systems Criteria (C/SCSC) and the policy objectives the Criteria are intended to promote. DoD Instruction 7000.10 describes reporting formats in detail for the Cost Performance Report (CPR), the Contract Funds Status Report (CFSR), and the Cost/ Schedule Status Report (C/SSR).

The CPR and the C/SSR are the two vehicles contractors are most likely to use to submit contract performance data to you. The CPR is the more detailed of the two, containing five unique formats. The formats cover current period and cumulative performance data by work breakdown structure (Format 1) and functional categories (Format 2), the contract performance plan and changes to it (Format 3), manpower loading (Format 4), and a written analysis of specific problems (Format 5). The C/SSR consists of one format with cumulative performance data presented by WBS elements, and a narrative explanation of specific problem areas within the contract.

CAPPS uses the cumulative data from Formats 1 and 2 of the CPR to perform its analyses. If the C/SSR is the reporting vehicle, CAPPS uses the cumulative performance data presented on its single format. The narrative explanations are not part of CAPPS' analysis; neither are CPR Formats 3 and 4. These Formats should not be ignored, however, since they provide important information for program management.

The division of the contract effort into work breakdown structure and functional elements increases visibility into segregated portions of the work effort and the performing people assigned to a work effort are tracked, problem areas can be pinpointed and solutions arrived at more readily. Work breakdown structures are governed in part by Military Standard 881A, Work Breakdown Structures for Defense Materiel Items. This Standard sets forth guidelines for establishing the top levels of general and product specific work breakdown structures. Functional element breakdowns are based on a contractor's internal organization within which the contract work will be performed.

Although requirements vary, the C/SSR applies to contracts of $2,000,000 or more which: are not firm fixed price; are at least twelve months in duration; and, are not required to submit a CPR. CPR submission is normally required for development contracts over $40 million or production contracts over $160 million. Both the CPR and C/SSR are usually submitted on a monthly basis.

The main data elements which are reported on these formats are the same ones utilized in CAPPS' analysis: Budgeted Cost for Work Scheduled (BCWS), which is the planned cost of the work scheduled; Budgeted Cost for Work Performed (BCWP), which is the planned cost of the work actually performed; Actual Cost of Work Performed (ACWP), which is the actual expenditure for the work performed; Budget at Completion (BAC), which is the initially planned cost for the work upon completion; and Latest Revised Estimate at Completion (LRE), which is the most recent estimate of what the completed work will actually cost.

Comparing BCWP to BCWS gives you a measure of how much of the planned work is being accomplished. This is expressed as a schedule variance. Comparing BCWP to ACWP yields a measure of how much is actually being expended for the work which is being done. This is expressed as a cost variance. In both cases, a negative variance indicates unfavorable performance - either behind schedule or over cost. A positive variance points to favorable performance - either ahead of schedule or below cost.

In making these and other analyses of contract performance data, CAPPS does all the detailed number crunching for you utilizing a wide variety of proven analysis techniques, formulas, and logic and consistency checks. Techniques used in CAPPS are a culmination of experience based on analyzing hundreds of contracts. Comparable techniques are in current use by the OSD controller, and Army, Navy and Air Force Headquarters and field organizations. These techniques are contained in the Guide to Analysis of Contractor Cost Data, prepared by HQ AFSC/ACC, Andrews Air Force Base, and are taught at the Contractor Performance Measurement Course given at the Defense Systems Management College. The results of these analyses help you make the most efficient use of your time by alerting you to trends and allowing you to concentrate on exceptional cases.

Section 6, Running the Program, provides a full discussion of the outputs resulting from the more complex data analyses which CAPPS performs.

Section 3. PROGRAM OVERVIEW

The CAPPS software module is composed of three main sections: Data Base Utilities, Analysis, and User Assistance. Figure 3-1 presents a representation of these three core functions. The Data Base Utilities section allows you to input new data, update data previously entered, save your data in files identified with your project, and list the contents of the data base on a printer.

The central function of the Analysis section is to present CAPPS' unique analysis of cost and schedule status information either at a contract summary level or by individual WBS or functional elements.

In the Analysis section, CAPPS offers two choices which allow an intermediate level of detail between contract summary information and examination of each and every WBS and functional element through the All Elements option.

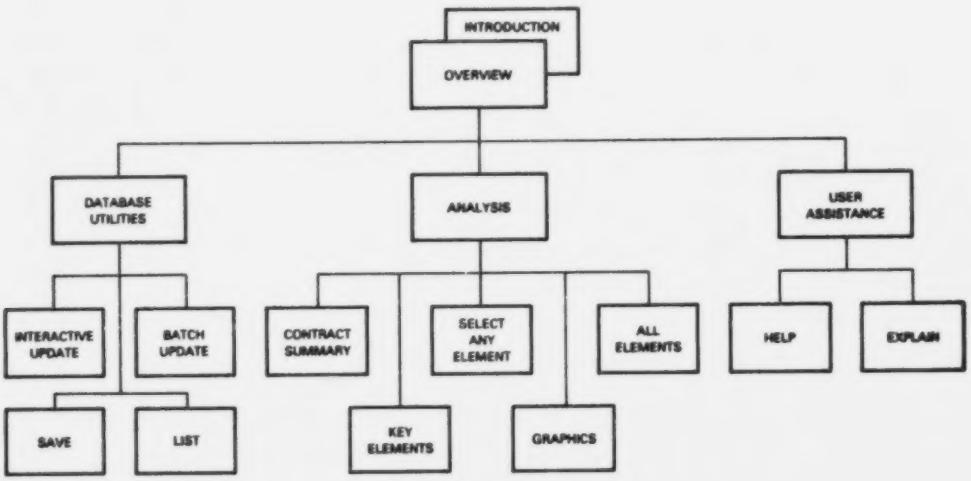


Figure 3-1 CAPPS' Core Functions

The first intermediate option involves designating that you want to see the status of the six "key elements". Under this option, CAPPS will segregate the six elements with the largest cost variance percentages. The first selection will be without regard to WBS level. Should you wish to look at only the six lowest level elements, you may do so. This selection of "key elements" provides you with a quick understanding of the WBS and functional areas of the project which are probably in the most trouble (based on cost variance percentages).

You may also choose the second intermediate option, select any element. This allows you to go directly to the status screen of any element you wish to examine.

At any level of detail, you may choose to examine one or more of the four graphic analyses which CAPPS prepares. These graphic presentations cover the topics of cumulative performance, variance trends, indices, and projected completion status.

There are two separate modes of User Assistance: Explain and Help. Explain can be accessed from every analysis screen and provides brief, informative answers to questions you may have about performance measurement terminology and conventions utilizing actual data from your program. The only screen from which EXPLAIN does not use actual data in the text are the STATUS and EAC screens. This is because these screens already use actual data in the text. When you enter the Explain system, you are presented only with material relevant to the screen or graph you entered from. This may be just one screen of information or you may be able to page through a number of screens exploring a topic.

The Help system is concerned with hardware and software operational issues such as CAPPS files, module flow and structure, use of the keypad, and how to get hardcopy outputs. Help can be accessed from anywhere by pressing the "?" key. A Help option also appears in the menu of all the Explain screens.

Section 6, Running the Program, covers the Analysis function in detail. Appendix B provides a Guide to User Assistance Topics. Section 9, Data Base Utilities, addresses the processes available for data entry and manipulation.

Section 4. SYSTEM REQUIREMENTS

4.1 Hardware Requirements

- IBM PC/XT/AT/Z-248 or a true compatible
- One floppy disk drive and one hard disk
- Standard Color Graphics Adapter (CGA), Enhanced Graphics Adaptor (EGA), or Video Graphics Array (VGA) board
- Color or monochrome monitor
- Epson or HP LaserJet printers or printer with identical printer codes
- 512KB RAM minimum (subject to size of data base to be analyzed)

4.2 Operating System Requirements

You will need MS/PC-DOS 3.1 or later operating system and the following special files:

- CONFIG. SYS
- ANSI.SYS (comes with DOS)

These files will be explained in detail in Section 5.3, Installation Instructions.

4.3 Compatibility

Based on information from various users, and limited testing by DSMC, the IBM version should run on the following systems:

AT&T 6300
COMPAQ Deskpro
COREDATA (Corona)
KAYPRO 16
Tandy 1000 (using PC-DOS)
TELEVIDEO (using PC-DOS)
PANASONIC Sr. Partner
WYSE-PC (with Paradise color graphics board)
WANG-PC (with the IBM color graphics emulator board)

CAPPS 2.20 will not run on a non-DOS system (such as the Intel 310 or Tandy 2000).

4.4 CAPPS Files

Disk 1:

CAPPS.EXE The CAPPS program

Disk 2:

SYSTEM01.FNT font for graphics
SYSTEM08.FNT font for graphics
SYSTEM16.FNT font for graphics
SYSTEM72.FNT font for graphics

WBS.DAT Sample Data Base
HELP.DAT Help Screens
SAMPLE.TXT Backup text file format of WBS.DAT file

Section 5. GETTING STARTED

5.1 Keyboard/Controls

In CAPPS, options to which you may move from a current screen appear in a menu at the bottom of the screen. Usually there are one or two lines of menu options. The selected option is bracketed by a cursor which looks like this [ ]. Each time you move to a new screen, the cursor automatically brackets the first option. This is referred to as the default option, the one you will usually want to choose from a particular screen.

You can move from option to option in three ways: by pressing the space bar until the cursor brackets the desired option; by pressing the key holding the first letter of the selection you want to make, i.e., press "U" to move the cursor to the Utilities option; or, by using the backspace key to move the cursor in reverse through the menu options. Regardless of which method you use to move the cursor, you activate a selection by pressing the <ENTER> key. This moves you to the screen represented by your selected option.

5.2 Making a Backup Copy

It is recommended that you make a backup copy of the CAPPS disks. You will need two blank, formatted disks for your backup copies.

To make your backup copies, simply copy all files from the CAPPS disks to your blank disks using the DOS DISKCOPY A: B: command. If you have only one disk drive, follow the screen prompts after you have started the copy procedure. Since CAPPS Version 2.20 can be run only from a hard disk, label your backup copy of CAPPS and store it and the distribution disks in a safe place.

5.3 Installation Instructions

5.3.1 ANSI.SYS

In order to start up properly, CAPPS uses what are known as ANSI control code sequences to perform various screen functions like changing colors and placing text in a certain location. Although the ANSI.SYS file comes with DOS, to use these sequences you must install the ANSI.SYS file through the CONFIG.SYS file as discussed below. Both files must reside in the root directory of your hard disk drive.

To load the ANSI.SYS file in your system, the following command must be in your CONFIG.SYS file:

DEVICE=ANSI.SYS

If the CONFIG.SYS file already exists, use your line editor (such as EDLIN) to avoid deleting the existing contents of the CONFIG.SYS file when adding ANSI.SYS to it.

If you do not have a CONFIG.SYS file, create one using the procedure explained below, making sure you are working from the disk drive containing DOS. Type:

COPY CON CONFIG.SYS

and press the <ENTER> key. You may then place the DEVICE=ANSI.SYS command in the CONFIG.SYS file by typing:

DEVICE=ANSI.SYS

and pressing <ENTER>. Finally, press the <CTRL> and <Z> keys simultaneously followed by <ENTER>.

After creating or modifying the CONFIG.SYS file, check your hard disk root directory to ensure that both the ANSI.SYS and CONFIG.SYS files are there. You may have to copy the ANSI.SYS file from your DOS subdirectory to the root directory. Reboot your system by turning it off and on again or by pressing the <CTRL>, <ALT>, and <DEL> keys simultaneously. Once it is in the CONFIG.SYS file, the ANSI.SYS file will be loaded every time you turn on your system.

5.3.2 Installing CAPPS on Your Hard Disk

CAPPS Version 2.20 can only be run from a hard disk. To install CAPPS on a hard drive, first create a subdirectory on the hard disk where you want CAPPS to reside, for example C:\CAPPS. Do this by issuing the following DOS command from your C: prompt:

MD CAPPS

Next insert the CAPPS Disk 1 into floppy drive (A) and type:

A:<ENTER>

to activate that drive. At the A: prompt issue the following DOS command to copy the files from the floppy disk in A drive to the C:\CAPPS subdirectory of the C drive:

COPY *.* C:\CAPPS

Repeat this procedure for Disk 2.

5.4 Helpful Hints

5.4.1 Six Key Elements vs. All Elements

Just because a WBS or functional element is not presented as one of the six key elements, do not think that it is not important. Although the cost variance percentage (CVP) is almost always the best indicator of performance problems, it is not the only valid one available. Other pieces of performance data, such as early schedule variances and large variances at completion are also invaluable in evaluating current and future contract status. A close look at the status screen for each element will reveal cost, schedule, and projected status information which is not necessarily reflected in cost variance percentages.

5.4.2 Insufficient Data Messages

The historical graphic plots portrayed in CAPPS require several data points to be meaningful. Although CAPPS does not prevent you from viewing the graphics when there are less than three periods of data, it does tell you that there is insufficient data for graphic analysis. Even four periods of data sometimes yield incomplete graphic analyses. If you do look at the

graphics when you have just a few periods of data in the data base, keep this in mind.

5.4.3 Numbering WBS and Functional Elements

WBS elements begin with the numeral "1"; functional elements begin with a "2". CAPPS will not recognize any other initial element number nor will it allow you to use alpha characters. In addition, you must follow standard sequences for subnumbers such as are found in MILSTD 881A. Note that element 1. is reserved for the total contract. A sample standard Sequence follows:

1.
1.1
1.1.1
1.1.2
1.2
1.2.1
1.2.2
1.2.3
1.3
1.3.1
1.4
2.1
2.1.1
2.2
2.2.1
2.3
2.3.1
2.4

Representative unacceptable numbers include:

2.0
3.5
1.1.0
1.A
B.1

If you do have a pre-established WBS structure, adding 1. in front of all numbers may allow you to use your structure within CAPPS without completely revising it.

5.4.4 Contract Completion Date

When you create a new contract data base in the interactive mode, a vital piece of information is not requested by the sequence of questions in the "New" option. This is the contract completion date. To enter the completion date for a new contract data base you have created, use the "Modify" option from the Interactive Update Menu.

5.4.5 Inserting New Elements

When you insert new WBS elements to your data base, CAPPS may occasionally put the element out of sequence, or may duplicate the element. To correct this problem, save your data via the UTILITIES SAVE command to a backup text file, and then BATCH load that file back into CAPPS.

5.4.6 Funny Characters on the Screen

If you see funny characters/garbage on the screen, the ANSI.SYS file was not loaded properly. See the instructions in Section 5.3.

5.4.7 Changing the Contract Start Date

The only way to change the contract start date is to save your data to a back up text file through the UTILITIES SAVE function. Then, modify the start date wherever it appears with a line editor such as EDLIN, or a word processor that does not put in the ASCII control codes (e.g., Wordstar in non-document mode). Then BATCH load the modified file back into CAPPS, (See Figures 9-11 and 9-12, pages 9-17 and 9-18 for the text file format).

5.4.8 Making a Normal Exit from CAPPS

A normal exit from CAPPS will prevent loss of data. Exit by selecting the Quit option from any screen where it is presented.

5.4.9 Printing from the Key Element or All Elements Screens

If you are in the "Key Elements" or "All Elements" screen, in order to print you need to press <ESC> to get the menu at the bottom of the screen. Then press <CTRL><G>.

5.4.10 Printing Graphics Screens

In all cases when you print a graphics screen using <CTRL><G> it takes about two minutes to print. No indication as to what is happening is given to the operator, because anything that would appear on the screen would also be printed. See Section 8 Program Outputs.

5.4.11 Conversion of Data Files

Data files created or used with CAPPS 2.10 or earlier versions need no conversion to run on a CAPPS Version 2.20 installation.

5.5 Limitations

5.5.1 Number of WBS Elements

The maximum number of WBS and functional elements that may be used for each contract is subject to two limitations. First, ten spaces have been allocated for WBS and functional element numbers in the spreadsheet column. The maximum number of levels which may be used depends, in part, on whether or not a WBS or functional element number contains double digits. A few examples will illustrate the possibilities:

- The element number 1.1.2.2.1 utilizes nine spaces and accommodates five levels.

- The element number 1.10.10.11 utilizes ten spaces and accommodates four levels.

- The element number 1.1.5.1.1.1 utilizes eleven spaces. Although CAPPS allows such a large number to be entered, it truncates the number to fit within its boundaries of ten spaces. CAPPS converts 1.1.5.1.1.1 to 1.1.5.1.1.

- The element number 1.10.1.1.1 utilizes ten spaces and accommodates five levels.

A second limitation on the number of elements you use is related to the All Elements screen. Because of the resolution of the screen, only about 100 elements can be displayed. Thus, from a practical standpoint, CAPPS is limited to 100 elements total.

5.5.2 Number of Months of Data

The maximum number of months of data that CAPPS will accept is 84.

5.5.3 Data

CAPPS will work correctly only with cumulative monthly data. Also, CAPPS does not roll up the data. You must enter cumulative data for all elements at all levels.

5.6 Starting the Program

5.6.1 Color Graphics Version

To RUN the color graphics version of CAPPS type:

CAPPS (for an Epson printer)
or
CAPPS -H (for a HP LaserJet printer)

and press the <ENTER> key. Be sure to include the space between the "S" and the "-H".

CAPPS expects the printer to be attached to the parallel port.

If the printer is connected to a serial port, add the option -S. If it is on a different port, add -1 or -2 or -3 depending on the port.

For example, to run CAPPS using a HP LaserJet printer on serial port 1, type:

CAPPS -S -1 -H

and press the <ENTER> key.

To run CAPPS on a configuration that includes a switchable EGA graphics card and a CGA monitor, type:

CAPPS -C

and press the <ENTER> key.

5.6.2 Tabular Version

This version provides tabular displays vice graphics. There will, however, still be some prompts associated with graphics such as "ZOOM" and "EXPAND". Ignore them. See Appendix E for illustrations of CAPPS' tabular displays.

To run the tabular version of CAPPS type:

CAPPS -T (for the Epson printer)
or
CAPPS -T -H (for the HP LaserJet printer)

and press the <ENTER> key.

5.6.3 Monochromatic Version

CAPPS can be run in a monochromatic installation. The lack of color, however, reduces the impact of the full-up CAPPS which highlights problems by use of red and yellow text background and which uses different color graphical lines for ease of viewing.

To run the monochromatic version of CAPPS type:

CAPPS -M

and press the <ENTER> key.

NOTE: The additional instructions and printer options discussed above are also applicable for running any version.

5.7 Exiting the Program

It is important that you make a normal exit from CAPPS in order to avoid losing your data. A normal exit is always accomplished by selecting the Quit option from any screen where it is available. Any other exit procedure will damage your data!

Section 6. RUNNING THE PROGRAM

The following discussion focuses on the Analysis function within CAPPS utilizing data for a fictitious program entitled LRP, Long Range Penetrator. It is organized in a step-by-step fashion following a "path" of what might be considered a normal, but not exhaustive, analysis process. Each step is discussed in terms of "what to do", "how to do it", and "why do it?". The intention is that novice users will review each step in detail, following the instructions, and that more experienced users will look only at the areas which they need to brush up on. A summarized generic presentation of the analysis structure is shown in Figure 6-1.

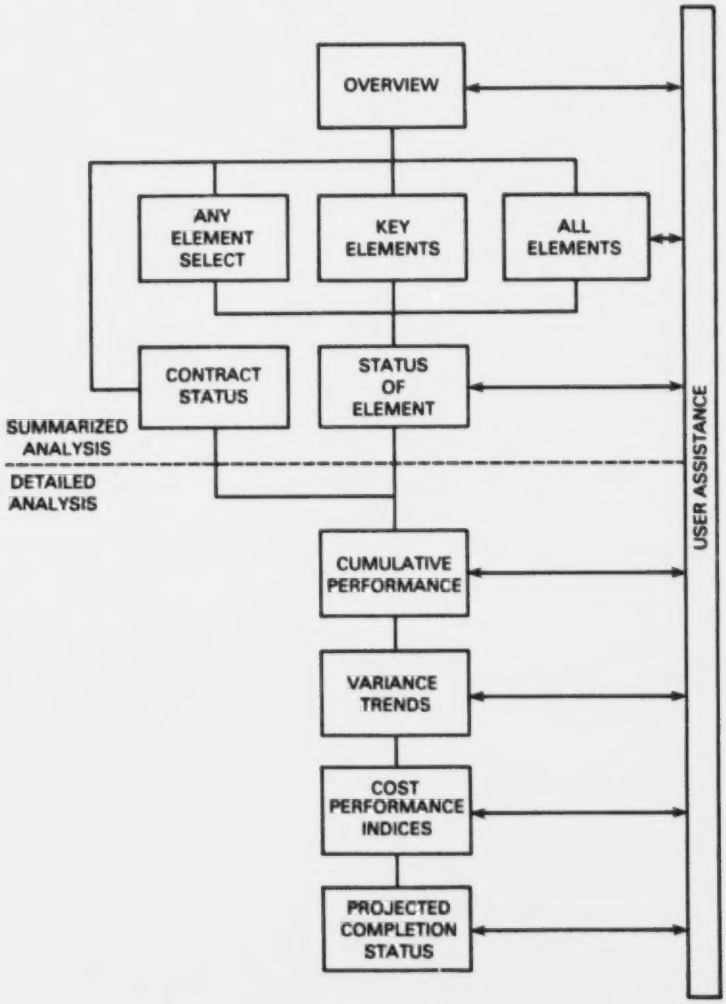


Figure 6-1 Analysis Structure

Figure 6-2 shows the path you will actually follow in this section, i.e. - only some of the many possible flows through the structure are covered. This section utilizes sample data contained CAPPS Disk 2.

If you have not yet followed the instructions in Section 5.2, (Making a Backup Copy); Section 5.3, (Installation Instructions); and Section 5.6 (Starting the Program), please do so before you continue.

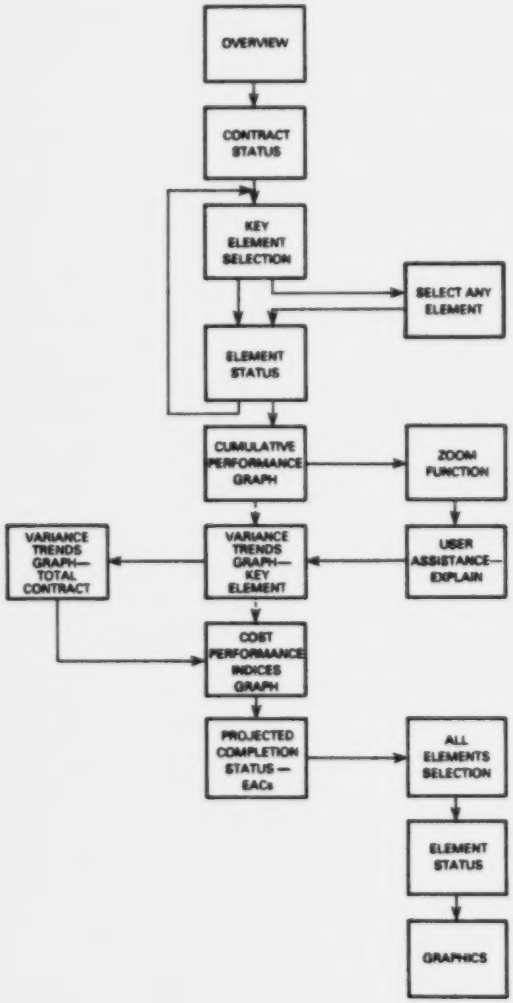


Figure 6-2 Analysis Path Followed in This Section

6.1 OVERVIEW

WHAT TO DO

Start at the Overview Screen to begin on the analysis path.

HOW TO DO IT

Press <ENTER> when prompted to do so at the Introductory Screen. This always takes you to the Overview Screen.

WHY DO IT?

If you want a synopsis of your contract parameters, the Overview Screen provides it. This synopsis includes the contract name, the date of the latest data entered, and a summary of the WBS and functional elements for which there is currently data on file. It also states the start and projected finish dates, the percent complete in time, the percent complete based on performance data, and a projection of whether or not the contract will finish within cost. Figure 6-3 is a sample Overview Screen.

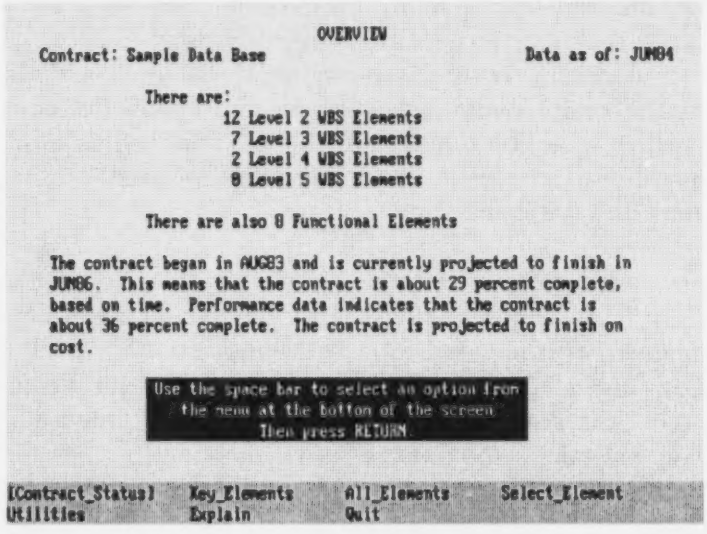

OVERVIEW
Contract: Sample Data Base
Data as of: JUN84
There are:
12 Level 2 WBS Elements
7 Level 3 WBS Elements
2 Level 4 WBS Elements
0 Level 5 WBS Elements
There are also 0 Functional Elements
The contract began in AUG83 and is currently projected to finish in JUN86. This means that the contract is about 29 percent complete, based on time. Performance data indicates that the contract is about 36 percent complete. The contract is projected to finish on cost.
Use the space bar to select an option from the menu at the bottom of the screen. Then press RETURN.
[Contract_Status] Key_Elements All_Elements Select_Element
Utilities Explain Quit

Figure 6-3 Overview Screen

From this screen, you have the options of: viewing Status Screens for the total contract, for the key elements, for all elements or for a selected element; utilizing data base utilities; entering the User Assistance mode; or quitting the program. In the next section, you will choose the Contract Status option.

6.2 CONTRACT STATUS

WHAT TO DO

Move to the Contract Status Screen.

HOW TO DO IT

[Contract Status] is automatically bracketed by the cursor when the Overview Screen appears since it is the first, or default, option. Press <ENTER> to activate the option.

WHY DO IT?

If you want more detail on cost and schedule status for WBS element 1.0, the total contract, the Contract Status Screen provides it. As shown in Figure 6-4, this screen has interpretive comments which are triggered by CAPPS' analysis of specific data element relationships. These comments are designed to alert you to significant trends in the data and their probable impact on the entire contract. They include comments on: the level of efficiency which would be required for the contract to finish on cost and the probability of achieving it; cost variance percentage; and schedule performance and projected slip.

From this screen, you have the following options: looking at the six key elements which are largely responsible for the overall data trends; examining the Cumulative Performance Graph at the total contract level; looking at all the elements included in the contract; returning to the Overview Screen; entering the User Assistance mode; or quitting the program. In the next section, you will take a look at the six key elements.

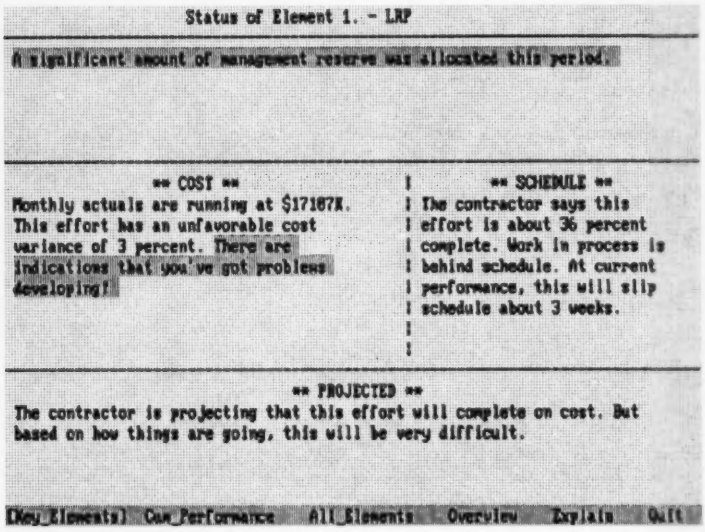

Status of Element 1. - LRP
A significant amount of management reserve was allocated this period.
** COST **
Monthly actuals are running at $17167K. This effort has an unfavorable cost variance of 3 percent. There are indications that you've got problems developing!
** SCHEDULE **
The contractor says this effort is about 36 percent complete. Work in process is behind schedule. At current performance, this will slip schedule about 3 weeks.
** PROJECTED **
The contractor is projecting that this effort will complete on cost. But based on how things are going, this will be very difficult.
[Key Elements] Cum Performance All Elements Overview Explain Quit

Figure 6-4 Contract Status Screen

6.3 KEY ELEMENT SELECTION

WHAT TO DO

Go to the Key Element Selection Screen.

HOW TO DO IT

Since [Key Elements] is the first option, the cursor is already on it. Just press <ENTER> to activate your selection.

WHY DO IT?

The Key Element Selection Screen allows you to quickly see the contract areas with the biggest current (and probably future) problems. This screen presents the six elements with the largest cost variance percentages. These elements are ordered by dollar amount and plotted by cost variance percent on the Key Element Selection Screen. The screen is illustrated in Figure 6-5.

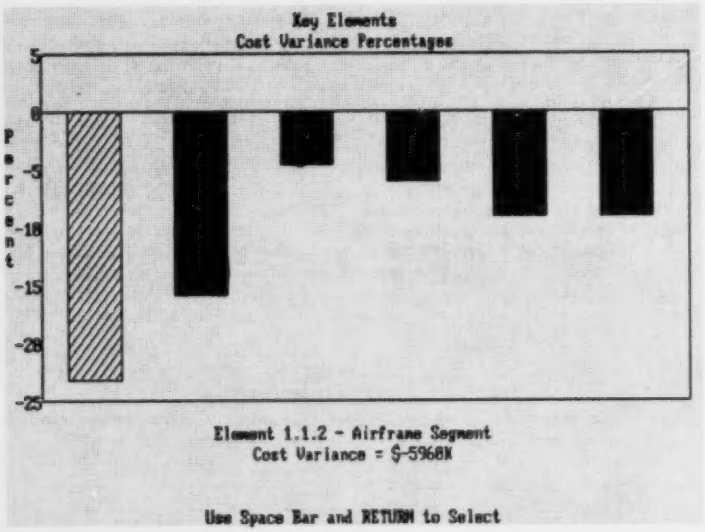


Figure 6-5 Key Element Selection Screen

By pressing the space bar, you can move from key element to key element on the screen. As you do so, the vertical bar representing the element you have moved to changes color from magenta (reddish purple) to white. At the same time, the content of the horizontal magenta bar below the graph changes to present the corresponding WBS or functional element number, name, and the dollar amount of the cost variance.

You may also depress the <ESC> key which will give you further selection options whereby you may restrict the key elements selected to only the lowest WBS element, thereby removing the possibility that both a lower and upper level element in the same WBS leg will be selected.

The purpose of this screen, in addition to providing the key element cost variance percent summary discussed above, is to permit selection of any key element you wish to examine in more detail. If you press <ESC> at this screen, you will also be given the options of going to All Elements, Overview, Explain, back to Key Elements, Select Any Element, view only the lowest level elements, all elements (when you have previously selected lowest level elements), or Quit. Figure 6-6 shows this screen.

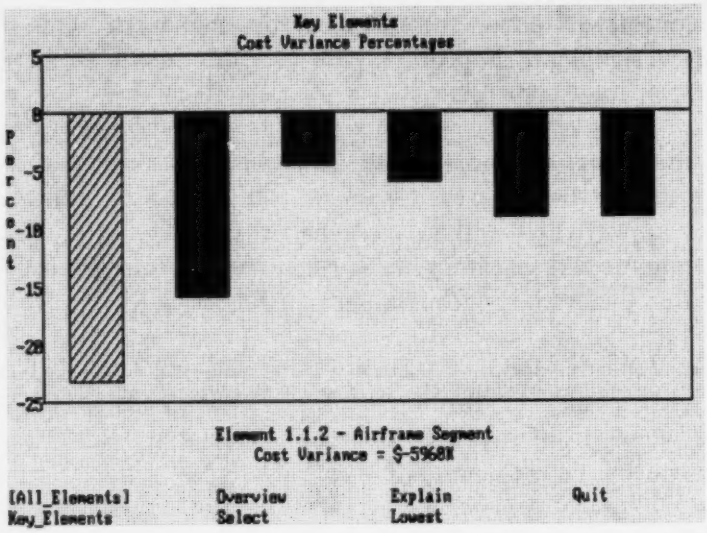


Figure 6-6 Key Element Option Screen

6.4 KEY ELEMENT STATUS

WHAT TO DO

Choose the key element you wish to examine further.

HOW TO DO IT

Use the space bar to move to the key element you want. When using the sample data, choose the second key element by pressing the space bar one time. When the vertical bar is white and the magenta horizontal bar contains the correct element number and name, press <ENTER> to activate your selection.

WHY DO IT?

The Status Screen which appears provides you with more detail on the cost and schedule status of the key element selected. You saw this same screen format in Figure 6-4 when we discussed overall contract status. Now, the information in the screen pertains just to the cost and schedule status of one element within the contract.

The first section of the screen states what percent this element is of the total contract based on the resources devoted to it. This gives you an idea of how significant a problem the element might be in terms of its impact on the total contract.

The comments related to cost, schedule, and projected status in the remaining three windows result from a compilation of numerous analysis techniques applied to the data elements in the file for that key element. These comments flag alarming or unusual trends using special highlighting techniques as illustrated by the shading in Figure 6-7.

The cost status section provides the bottom line analysis based on cost, schedule and technical performance. Typical comments for the cost window warn you when problems are apparent and identify significant decreases (increases) in the rate of expenditures.

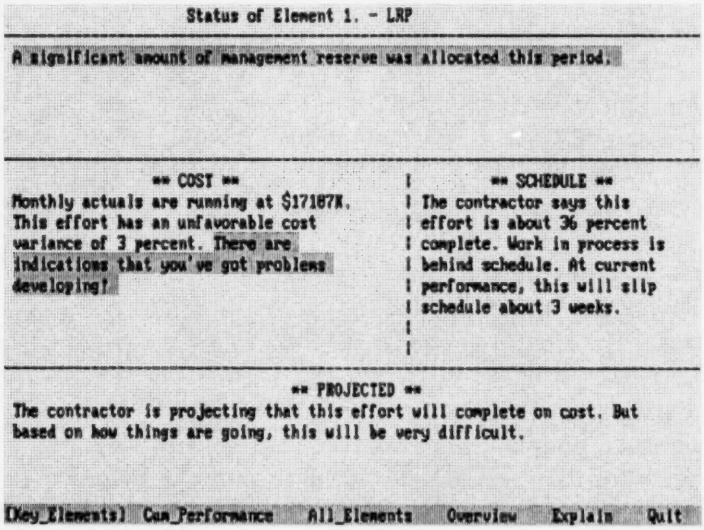

Status of Element 1. - LRP
A significant amount of management reserve was allocated this period.
** COST **
Monthly actuals are running at $17187K. This effort has an unfavorable cost variance of 3 percent. There are indications that you've got problems developing!
** SCHEDULE **
The contractor says this effort is about 36 percent complete. Work in process is behind schedule. At current performance, this will slip schedule about 3 weeks.
** PROJECTED **
The contractor is projecting that this effort will complete on cost. But based on how things are going, this will be very difficult.
(Key_Elements) Cum_Performance All_Elements Overview Explain Quit

Figure 6-7 Key Element Status Screen

In the schedule window you are likely to see comments on whether work in process is behind or ahead of schedule, what percent of the total effort has been completed to date, and projections of schedule slip in weeks if current performance trends continue.

The projected status window usually deals with the feasibility of meeting the cost goals set for the contract. Typical comments include an evaluation of the feasibility of the contractor's current projections.

See Appendix A for a complete listing of rules for Status Screen Comments.

From this screen, you can choose to: return to the Key Element Selection Screen; examine the cumulative performance information displayed on a graph for the current key element; return to the Overview Screen; answer a question about the Status Screen through the User Assistance function; or quit the program. In the next section, you will examine a second method of reaching the Status Screen for an element, specifically the element we just explored, 1.1.2.2 Structure.

6.5 SELECT ANY ELEMENT

WHAT TO DO

Move to the element status screen for element 1.1.2.2 Structure utilizing the Select Any Element function.

HOW TO DO IT

With the cursor brackets around [Next Key Element] press <ENTER> to activate the selection. This returns you to the Key Element Selection Screen. Press <ESC> then press the space bar four times to move the cursor brackets to [Select] Press <ENTER>. The following message will appear on the screen:

Enter Selected Element (or ? for selection)

If you know the number of the desired WBS or functional element, type in that number at the prompt. If you do not know the number of the element, type a "?" and press <ENTER>. A listing will then appear of all the available WBS and functional elements which may be selected, as presented in Figure 6-8.

At the prompt:

Enter Selected Element (or ? for selection)

Type the WBS element number 1.1.2 .2 and press <ENTER>. This will take you to the Status Screen we explored in section 6.4.

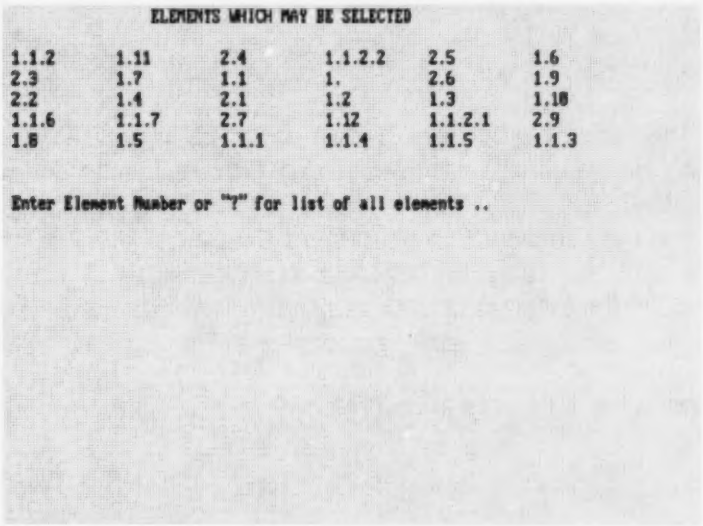


Figure 6-8 WBS and Functional Elements Which May Be Selected

WHY DO IT?

The Any Element Select function provides the quickest means of locating the Status Screen for a specified WBS or functional element if you know the element's number. The other two options for arriving at a Status Screen, Key Element Select and All Element Select, require you to move through and look at other elements before accessing the one in which you are interested.

In the next section, you will examine the Cumulative Performance Graph for this element.

6.6 CUMULATIVE PERFORMANCE GRAPH

WHAT TO DO

Move to the Cumulative Performance Graph for the same key element.

HOW TO DO IT

Press the space bar one time so that the cursor brackets are around [Cum Performance]. Press <ENTER> to activate your selection.

WHY DO IT?

If you need a quick look at the most basic, yet comprehensive, performance data relationships, the Cumulative Performance Graph provides it. This graph, presented in Figure 6-9, gives you a pictorial representation of the five main performance measurement data elements: ACWP, BCWS, BCWP, BAC, and LRE. Each of these data elements is portrayed by a different line type and color. BCWP is a white dotted line, BCWS is a long dashed red line, ACWP is a solid blue line, BAC is a dotted blue line, and LRE is a purple line.

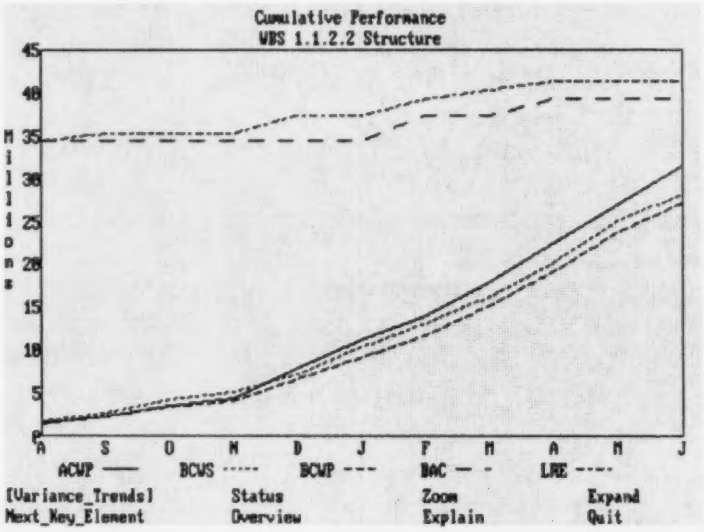


Figure 6-9 Cumulative Performance Graph

Since BCWS is the plan for getting work done and BCWP is the measure of how much work is being done, the relationship between these two lines is crucial to contract status. If the BCWP line is below the BCWS line, less work is being accomplished than was planned. If ACWP is also below BCWS, there is less of a problem in this situation than there would be if ACWP were greater than BCWS. In the first case, resource expenditure is more in line with work accomplishment.

The BAC and LRE lines provide information regarding the initial Budget at Completion and the Latest Revised Estimate for the completed work. The BAC is the initial total budget for the displayed element (WBS element, functional element or total contract), as modified to date by contract changes, internal replanning, and management reserve. It is the currently approved amount within the contract for performance of a stated technical scope.

The LRE is composed of actual costs to date plus the contractor's estimated cost for completing the work remaining under the contract. The Cumulative Performance Graph lets you see when and how much these two measures of cost at completion diverge.

Note that the BAC line in the example begins at about 34 million, while the BCWS line begins at zero. This is a reflection of the nature of the two data elements. BAC is a measure of contract status at completion while BCWS is a measure of status as it is planned to be accumulated over the life of the contract. In the same way, LRE is a measure of completion status while ACWP and BCWP begin at zero along with BCWS and increase as accomplishment and expenditures occur. These three data elements portraying cumulative status often form an S-shaped curve over time. This is due to a low level of start up effort, a middle period where effort is increasing steadily, and a period of tapering off at the end of a contract.

The menu options provided at this Graph are: view the Variance Trends Graph for the same key element; return to the Status Screen for this key element; enter the User Assistance mode to learn more about the Cumulative Performance Graph or terminology; use the Zoom or Expand function to increase visibility into the relationship of the lines on the Cumulative Performance Graph; see the other key element choices; return to the Overview Screen; or quit the program. In the next section, you will use the Zoom function to explore the Graph in more detail.

6.7 ZOOM AND EXPAND FUNCTION

WHAT TO DO

Use the Zoom option.

HOW TO DO IT

Press the space bar two times to move the cursor to [Zoom] and press <ENTER> to activate the selection.

WHY DO IT?

The Zoom function focuses on the most current historical trends by portraying the last six months of data as opposed to the total number of months of data you have on file. This increases visibility into relationships between BCWS, BCWP, and ACWP as illustrated in Figure 6-10.

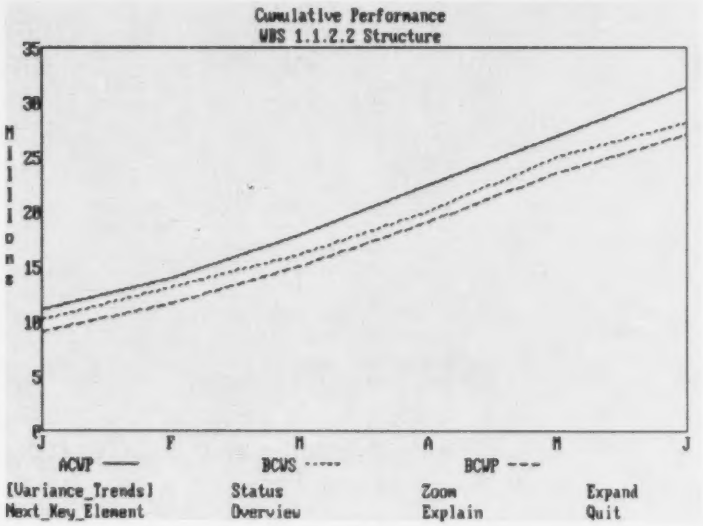


Figure 6-10 Cumulative Performance Graph-Zoom Option

WHAT TO DO

Use the Expand option.

HOW TO DO IT

Press the space bar three times to move the cursor to [Expand] and press <ENTER> to activate the selection.

WHY DO IT?

The expand function permits you to view the entire period of performance of the contract and the performance to date of the element you are examining. Since the CPR only provides for contract completion, you need to view the performance trends of lower level elements against lower level schedules you may have. Figure 6-11 shows the expand option for a lower level element.

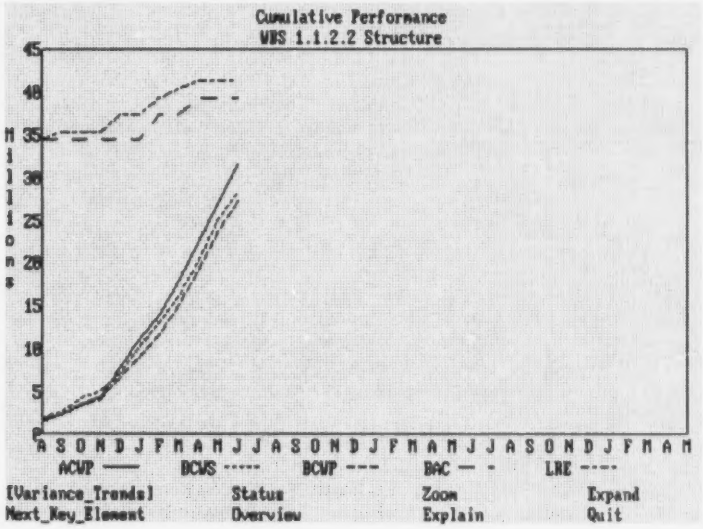


Figure 6-11 Cumulative Performance Graph-Expand Option

From the Zoom and Expand option, you have the same choices as presented at the Cumulative Performance Graph. Choosing any of these now will take you exactly where the same choice would have taken you from the Cumulative Performance Graph - except for the Zoom option. If you are already in Zoom mode, selecting and activating Zoom again will take you back to the full scale Cumulative Performance Graph. In the next section, you will go directly from the Zoom option to the User Assistance option.

6.8 USER ASSISTANCE OPTION -EXPLAIN

WHAT TO DO

Move to the Explain option for the Cumulative Performance Graph.

HOW TO DO IT

Press the space bar six times or "E" two times to move the cursor to [Explain] and then press <ENTER> to activate your selection.

WHY DO IT?

The Explain system introduces you to new performance measurement terminology, refreshes your memory on what the acronyms mean, and helps you to understand the significance of the relationships between the data elements. The Explain screen for the Cumulative Performance Graph, Figure 6-12, provides very brief explanations of the data elements represented on the Graph and a short discussion on how you might expect these lines to look. Notice that the screen embeds the actual data from the graph from which you exited.

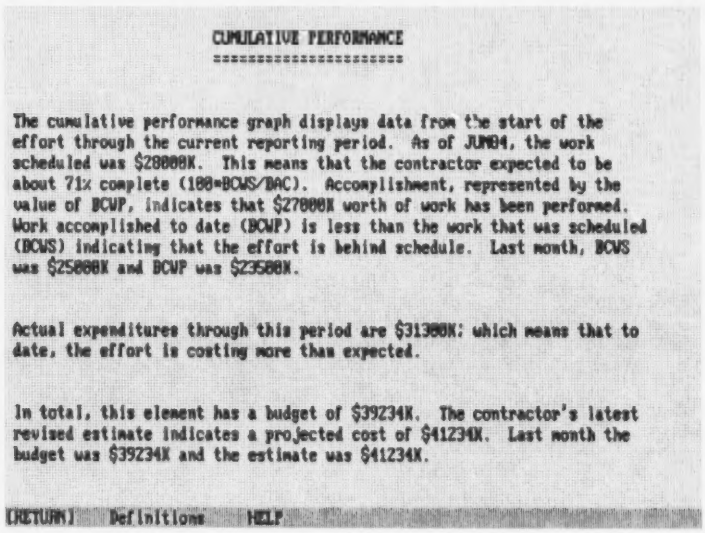

CUMULATIVE PERFORMANCE
The cumulative performance graph displays data from the start of the effort through the current reporting period. As of JUN94, the work scheduled was $28000K. This means that the contractor expected to be about 71% complete (100*BCWS/BAC). Accomplishment, represented by the value of BCWP, indicates that $27000K worth of work has been performed. Work accomplished to date (BCWP) is less than the work that was scheduled (BCWS) indicating that the effort is behind schedule. Last month, BCWS was $25000K and BCWP was $23500K.
Actual expenditures through this period are $31300K; which means that to date, the effort is costing more than expected.
In total, this element has a budget of $39234K. The contractor's latest revised estimate indicates a projected cost of $41234K. Last month the budget was $39234K and the estimate was $41234K.
[RETURN] Definitions HELP

Figure 6-12 Cumulative Performance Graph-Explain

From this screen you have the options of: returning to the full scale Cumulative Performance Graph; entering the Help portion of User Assistance; and taking a look at more elaborate definitions for the data elements. In the next section, you will examine the second graphic option, the Variance Trends Graph, for the same key element.

6.9 VARIANCE TRENDS GRAPH - KEY ELEMENT

WHAT TO DO

Move to the Variance Trends Graph.

HOW TO DO IT

At the Explain screen, choose the [Return] option by pressing <ENTER>. This brings you back to the Cumulative Performance Graph where the first option [Variance Trends] is marked with the cursor. Activate this option by pressing <ENTER>.

WHY DO IT?

The Variance Trends Graph, portrayed in Figure 6-13, presents lines plotted for cost variance, schedule variance, and variance at completion against a time and dollar scale.

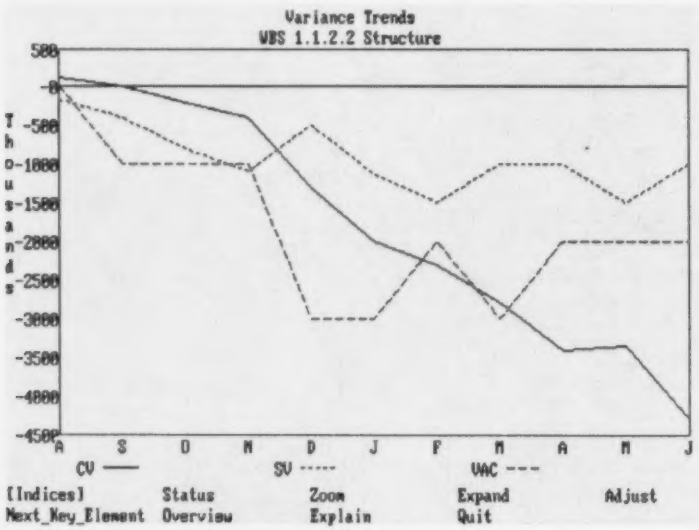


Figure 6-13 Variance Trends Graph - Key Element

The cost variance (CV) is represented by a solid blue line, the schedule variance (SV) by a dashed red line, and the variance at completion (VAC) by a dotted white line. These variances give you, respectively, measures of what was actually spent for a given technical effort versus what was planned to be spent, what work was accomplished versus what was planned to be accomplished in a specified time frame, and what is now planned to be the total final cost as opposed to what the effort was originally planned to cost. If any of these variances has a negative value, unfavorable performance is indicated, i.e. work is costing more or taking longer than planned.

Figure 6-14 shows the same information with the Expand Option. Notice the horizontal axis has been expanded to reflect the entire performance period of the WBS element being reviewed.

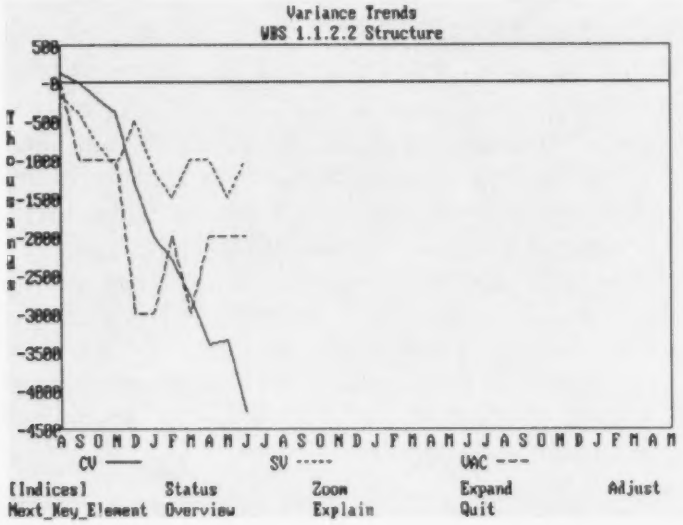


Figure 6-14 Variance Trends Graph - Expand Option

As the title of the Graph indicates, what you should focus on in your examination is data trends reflected in these lines. Sudden downturns or upturns, slow but consistent downward movement, and unfavorable variances (especially schedule) early in the contract are all things to look for. Note that all the variance plots begin at zero. As time passes, as work gets done, and/or resources are expended, variations from plan can occur and begin to show up.

The options from this screen include: looking at the Indices Graph for the same key element; returning to the Status Screen for that element; using the Explain system to answer some terminology or data interpretation questions; moving to the next key element; returning to the contract Overview; or quitting the program. In the next section, you will move through the Overview option to take a look at the slightly different Variance Trends Graph which CAPPS prepares at the total contract level.

6.10 VARIANCE TRENDS GRAPH-TOTAL CONTRACT

WHAT TO DO

Move to the Variance Trends Graph for the total contract.

HOW TO DO IT

At the key element Variance Trends Graph press the space bar six times to move the cursor to [Overview] and press <ENTER> to activate the selection. You are now back at the contract level Overview Screen. Since you want to examine the Variance Trends Graph for the entire contract, you will follow the contract status path instead of either the key elements or all elements paths. [Contract Status] is the first, or default, option from the Overview Screen, so the cursor is automatically there. Just press <ENTER> to activate your selection. This moves you to the Status Screen for the overall contract. Press the space bar one time to move the cursor to [Cum Performance] and press <ENTER> to activate. This brings you to the Cumulative Performance Graph for the whole contract. The first option is [Variance Trends]. Since the cursor is already there, press <ENTER> to activate the selection.

WHY DO IT?

The Variance Trends Graph at the total contract level (Figure 6-15) includes a plot of Management Reserve application in addition to cost, schedule and at completion variances for the contract. The Management Reserve line (blue dotted) shows the initial amount set aside for covering unforeseen cost, schedule, or technical events and tracks decreases as management reserve is applied. Watch for sudden sharp drops, especially early in the contract.

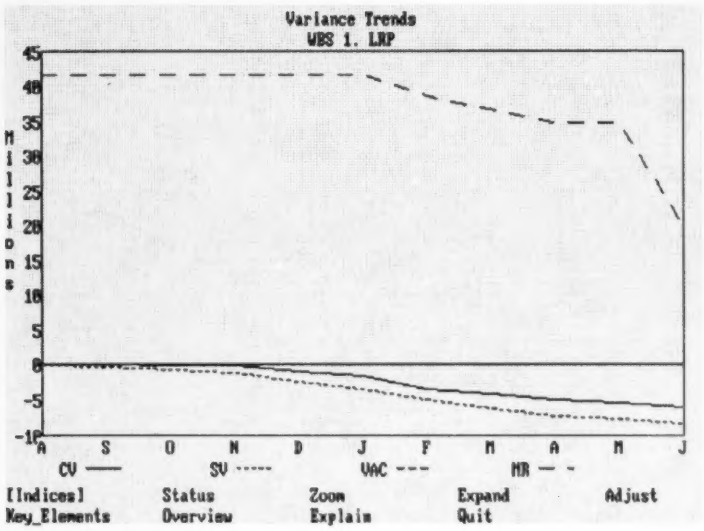


Figure 6-15 Variance Trends Graph - Total Contract

From this screen, you have the options of: viewing the Indices Graph for the total contract; returning to the Status Screen for the total contract; entering the User Assistance mode to get an explanation of the Variance Trends Graph; viewing the six key elements; returning to the Overview Screen; adjusting the graph for management reserve, or quitting the program. In the next section, you will return to the key element path and examine the Cost Performance Indices Graph for the element you were evaluating earlier. Should you desire to select the "adjust" option, Figure 6-16 shows the effect of combining cost variance and management reserve. This display shows the resultant curve should management reserve ultimately be used as an offset to cost variance.

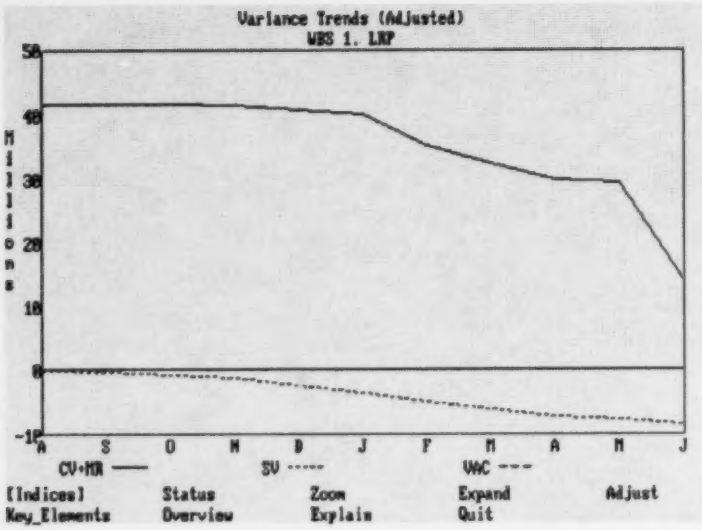


Figure 6-16 Combined Cost Variance and Management Reserve

6.11 COST PERFORMANCE INDICES GRAPH

WHAT TO DO

Move to the Cost Performance Indices Graph for the second key element.

HOW TO DO IT

Starting from the Variance Trends Graph for the total contract, press the space bar five times so the cursor rests on [Key Elements]. Press <ENTER> to activate. When using the sample data, you want the second key element presented on the Key Element Selection Screen. Since you have already looked at some information for it, CAPPS has automatically cycled to the next (third) key element. Press the backspace key once to return to the second key element. Press <ENTER> to activate that key element. The screen which appears next is the Status Screen. Press the space bar once, to [Cum Performance] and press <ENTER> to activate. From the Cumulative Performance Graph, press <ENTER> to activate the Variance Trends Graph. From the Variance Trends Graph, press <ENTER> to activate the first selection, [Indices].

WHY DO IT?

The Indices Graph, shown in Figure 6-17, plots lines for current and cumulative cost performance indices and for the predicted cost performance. The cumulative performance index (solid blue line) shows cost efficiency since contract inception while the current performance index (dotted white line) shows cost efficiency for the most recent period. It can be easily thought of as measuring what was spent for each dollar's worth of work performed. If more than a dollar's worth of work is accomplished for each dollar spent, the situation is favorable; if less than a dollar's worth of work is accomplished, then the situation is unfavorable. Look at the cumulative and current CPIs together since the current measure tends to fluctuate.

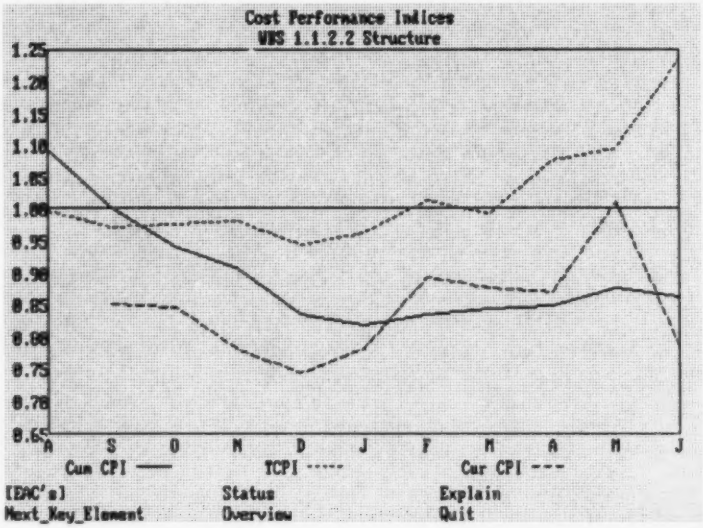


Figure 6-17 Cost Performance Indices

The cost performance Index To Go (dashed red line) is a measure of the cost efficiency which would be required to complete the work within the cost stated in the Latest Revised Estimate. It compares the planned cost of the work remaining (BAC - BCWP) to the estimate to complete (LRE - ACWP). If the Index To Go indicates a required efficiency greater than the cumulative CPI, some questions are in order about how this increased efficiency is to be obtained.

The options from this Graph include: moving to the Projected Completion Status (EAC) Graph for the same element; returning to the Status Screen for that element; entering the User Assistance mode to explore the concepts involved in the Indices Graph in more detail; moving to the screen for selection of the next key element; returning to the Overview Screen; and quitting the program. In the next section, you will investigate the EAC option.

6.12 PROJECTED COMPLETION STATUS - EAC's

WHAT TO DO

Move to the Projected Completion Status Graph.

HOW TO DO IT

At the Cost Performance Indices Graph, the option marked by the cursor is [EAC's], the first selection. Press <ENTER> to activate the selection.

WHY DO IT?

The Projected Completion Status Graph, presented in Figure 6-18, is designed to facilitate comparison of the contractor's Budget at Completion and Latest Revised Estimate to four Estimate at Completion values generated from the actual performance data. The two projections prepared by the contractor are shown in cyan (bluish green) bars while the four independent projections are shown in magenta (reddish purple) bars. The four CAPPS-generated EAC measures are based, respectively, on cumulative cost performance (CUM), the last three months of cost performance (3MO), the latest month of cost performance (CUR), and a combination of cumulative cost and schedule performance (C&S). The numerical values are embedded in the EAC base. The horizontal line which crosses all EACs is the Contract Target Cost (CTC). This line only appears at the Total Contract level. This is why Figure 6-18 is shown at the total contract level.

Hopefully, these values are all about equal. If any one is out of sync, it should be the BAC; LRE and the four independent projections should be very close. If not, the basis for the contractor's projection needs to be evaluated.

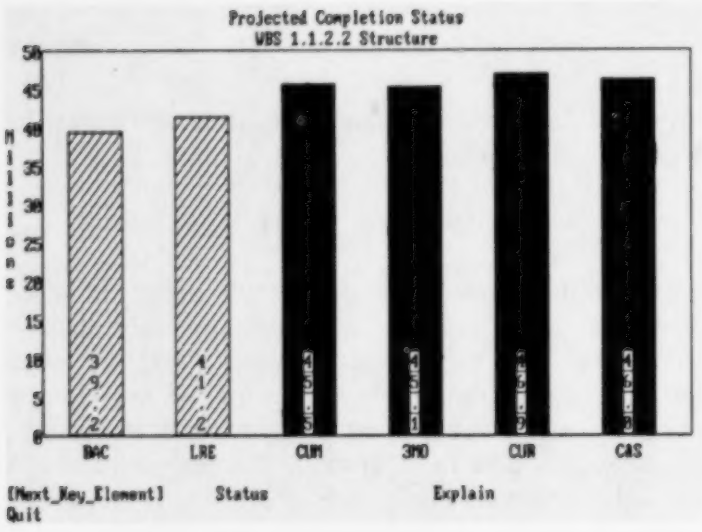


Figure 6-18 Projected Completion Status

From this Graph, the following options are available: move to the next element selection screen; return to the Status Screen for the same key element; explore EAC methodologies through the User Assistance function; and quit the program. In the next section, you will use the Status option to move into position for the all elements path.

6.13 ALL ELEMENTS SELECTION

WHAT TO DO

Move from the Projected Completion Status Graph to the All Elements Selection Screen.

HOW TO DO IT

At the Projected Completion Status Graph, press the space bar twice from the overall contract screen or once from any other element screen to move the cursor brackets to [Status]. Press <ENTER> to activate the option. This takes you to the Status Screen for the key element you have been following. At this screen, press the space bar three times from the overall contract screen and twice from any other element screen to the cursor brackets to [Overview]. Press <ENTER> to activate the option. At the Overview Screen, press the space bar two times to move the cursor brackets to [All Elements]. Press <ENTER> to activate the option.

WHY DO IT?

The All Elements Selection Screen (Figure 6-19) presents all the contract's WBS and functional elements organized by cost variance percentages, from negative to positive. As in the Key Elements Selection Screen, you use the space bar to move from element to element.

As you do so, the selected element appears as a white vertical bar while the corresponding element number, name, and variance dollar amount appear in the magenta (reddish purple) horizontal bar below the graphic. You can press <ENTER> to see the Status Screen for the selected element. If you select [Cum Performance] from the Status Screen, you will start on the graphics path in the same sequence discussed above for key elements.

Alternative options are presented if you press <ESC> at this screen: Key Elements, Overview, Explain, back to All Elements, Select Any Element, or Quit.

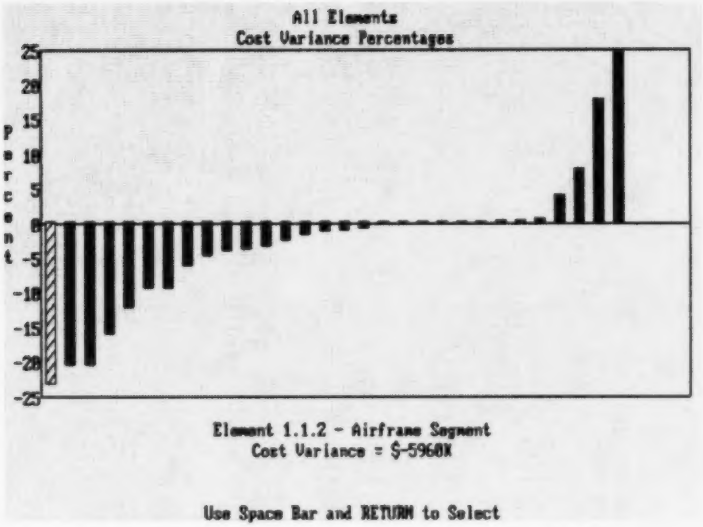


Figure 6-19 All Elements Selection Screen

As discussed in the beginning of this section, we have followed a typical path through CAPPS' Analysis function. We have gone from total contract level through an evaluation of key element status and graphics, taking side trips into Total Contract Variance Trends and User Assistance. We have finished up at the All Elements Selection Screen from which any contract level may be examined. Although we have by no means looked at everything CAPPS has to offer, you now have enough familiarity with the analysis structure to move around comfortably within CAPPS yourself. As you increase your expertise, Section 7, Fast Track, offers you reminders on "how to get there from here."

Section 7. FAST TRACK

The matrix chart presented on the following page is designed to help you find your way quickly from one designated screen to another. Across the top of the matrix are the "From" screens; along the left side are the "To" screens. As is evident from following just a few paths through the matrix, you can get anywhere in CAPPS by starting at the Overview Screen or at one of the element Status Screens. From any element Status Screen, the graphics path is always available (for that element) by pressing the space bar once to [Cum Performance] and pressing the Return key. Keep these hints in mind and you will soon be able to "fast track" through CAPPS on your own.

Chart Transposed to

End of Volume.

Section 8. PROGRAM OUTPUTS

CAPPS was designed for on-line analysis of performance data and has no report formats available. However, your keyboard may offer a key which allows you to send a copy of what is on the screen to the printer. On many PCs the key will say "PrtSc". This key needs to be pressed in conjunction with the uppercase shift key (this key has an up-arrow printed on it).

An alternative method of printing the screen is provided. To invoke the screen printout, use the **<CTRL><G>** combination (press the CONTROL (CTRL) key and the G key simultaneously). This will delete the menu selection from the bottom of the screen and replace it with the contract title and date, and print the screen. **Note:** This command requires the menu selections be present at the bottom of the screen, so you will need to press the ESC key prior to **<CTRL><G>** for the Key Elements and All Elements screens. If you are using a CGA configuration with an Epson printer or an EGA configuration with a HP LaserJet printer and printing a graphics screen, there will be approximately a two minute delay before printing begins. This is necessary in order to provide a hard copy of larger dimensions than the ordinary screen dump.

CAPPS provides a feature which allows you to print a listing of the data in your data base. Please see Section 9.6 for a full discussion of how to operate the List function.

Section 9. DATA BASE UTILITIES

The Data Base Utilities function allows you to enter new data, edit existing data, save data you have entered, and list data on a printer. The flow chart in Figure 9-1 illustrates the utility functions which will be discussed in this section.

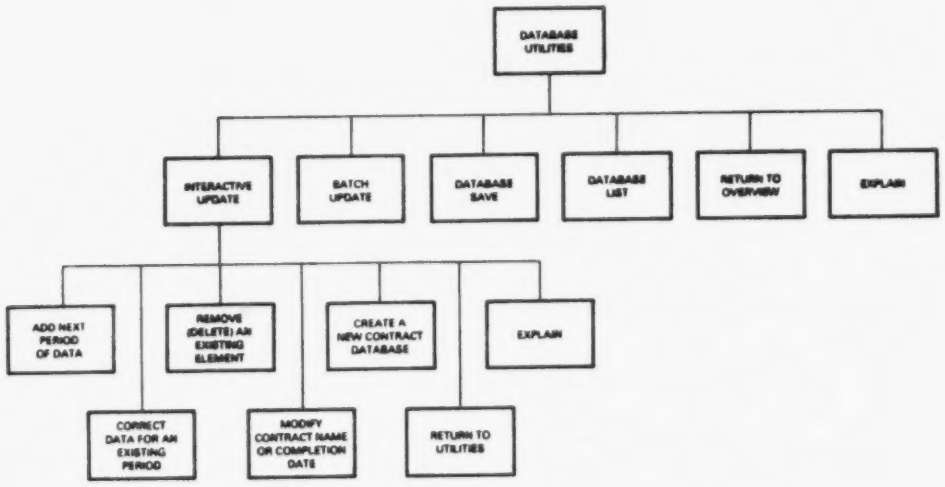


Figure 9-1 Data Base Utilities

9.1 Data Base Utilities

WHAT TO DO

Enter the Utilities function.

HOW TO DO IT

From the Overview Screen, press the space bar four times or type the letter "U" to select the Utilities option. Then press <ENTER> to activate the option. You are now in a position to provide CAPPS with data on your contract's performance. Figure 9-2 presents the Data Base Utilities Menu. You can select interactive update, perform batch update, save the data base to a text file, list the data base on a printer, return to Overview, or enter the User Assistance mode. In the next section, you will work with the first option, Interactive Update.

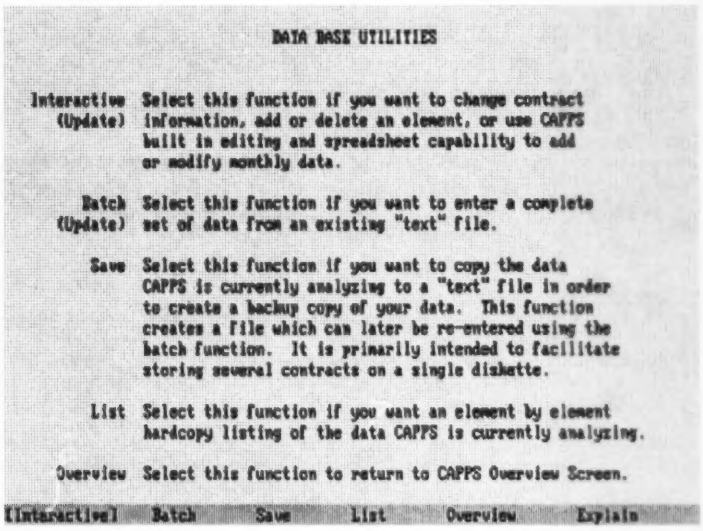

DATA BASE UTILITIES
Interactive (Update) Select this function if you want to change contract information, add or delete an element, or use CAPPS built in editing and spreadsheet capability to add or modify monthly data.
Batch (Update) Select this function if you want to enter a complete set of data from an existing "text" file.
Save Select this function if you want to copy the data CAPPS is currently analyzing to a "text" file in order to create a backup copy of your data. This function creates a file which can later be re-entered using the batch function. It is primarily intended to facilitate storing several contracts on a single diskette.
List Select this function if you want an element by element hardcopy listing of the data CAPPS is currently analyzing.
Overview Select this function to return to CAPPS Overview Screen.
[Interactive] Batch Save List Overview Explain

Figure 9-2 Data Base Utilities Menu

9.2 Interactive Update

WHAT TO DO

Choose the Interactive Update option.

HOW TO DO IT

At the Data Base Utilities Menu, the [Interactive Update] option is bracketed.

Press <ENTER> to activate the selection. The Interactive Update Menu (Figure 9-3) presents the choices you have for working with the data in this mode. You may add the next period of data, correct data for an existing period, remove an existing WBS or functional element, modify the contract name or completion date, create a new contract data base, return to the Data Base Utilities Menu (finish), or enter the User Assistance mode. In the next section, you will add the next period of data for an existing element.

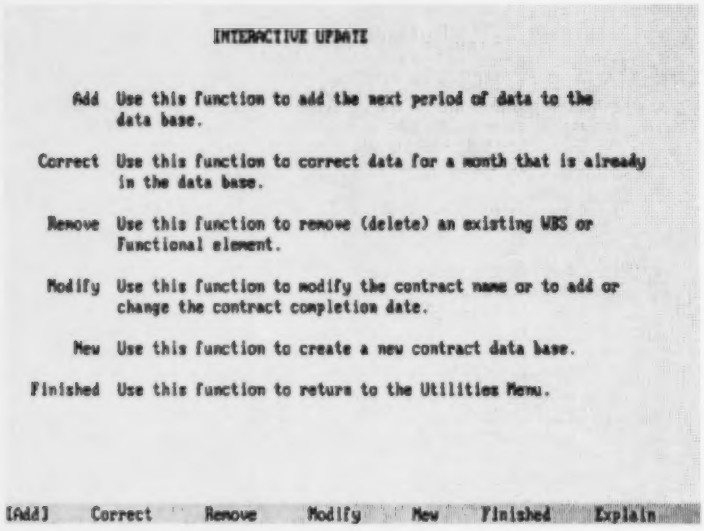

INTERACTIVE UPDATE
Add Use this function to add the next period of data to the data base.
Correct Use this function to correct data for a month that is already in the data base.
Remove Use this function to remove (delete) an existing WBS or functional element.
Modify Use this function to modify the contract name or to add or change the contract completion date.
New Use this function to create a new contract data base.
Finished Use this function to return to the Utilities Menu.
[Add] Correct Remove Modify New Finished Explain

Figure 9-3 Interactive Update Menu

9.2.1 Add Next Period of Data

WHAT TO DO

Choose the "add the next period of data" option.

HOW TO DO IT

At the Interactive Update Menu, [Add] is the first option, so it is bracketed by the cursor. Press <ENTER> to activate the selection. The screen will prompt you to type the letter "Y" (for yes) if the stated period is the one for which you wish to enter data. The period stated in the prompt is the month/year which immediately follows the last period for which CAPPS already has data on file. Dates in CAPPS have standard abbreviation formats consisting of a three-letter month designation followed immediately by two digits for the year. Standard month abbreviations are: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC. In combination with a year, the abbreviations appear as follows: JAN83, MAR87, etc. Type the letter "Y". A wait message will appear on the screen while the data spreadsheet is being set up.

The data spreadsheet which is displayed for adding the next period of data is portrayed in Figure 9-4. The spreadsheet lists all existing WBS and functional element numbers and names for the contract. Corresponding columns for BCWS, BCWP, ACWP, BAC, and LRE provide space for you to enter data for the period appearing on the top line of the screen.

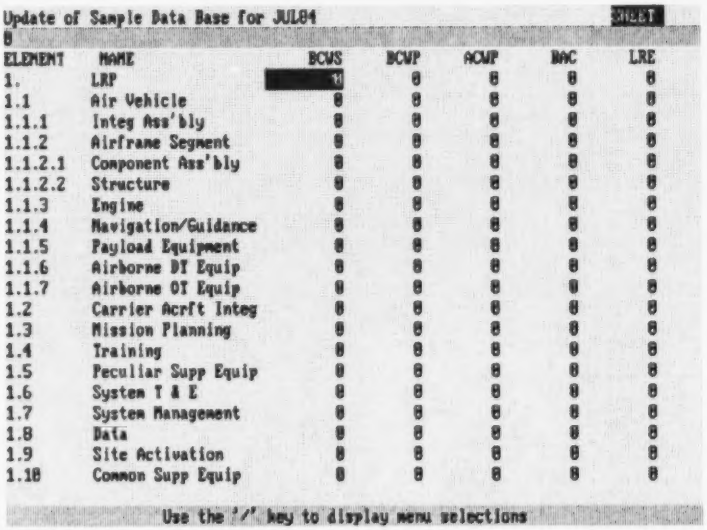

Update of Sample Data Base for JUL84
SHEET
0
ELEMENT NAME BCWS BCWP ACWP BAC LRE
1. LRP 0 0 0 0 0
1.1 Air Vehicle 0 0 0 0 0
1.1.1 Integ Ass'bly 0 0 0 0 0
1.1.2 Airframe Segment 0 0 0 0 0
1.1.2.1 Component Ass'bly 0 0 0 0 0
1.1.2.2 Structure 0 0 0 0 0
1.1.3 Engine 0 0 0 0 0
1.1.4 Navigation/Guidance 0 0 0 0 0
1.1.5 Payload Equipment 0 0 0 0 0
1.1.6 Airborne DT Equip 0 0 0 0 0
1.1.7 Airborne OT Equip 0 0 0 0 0
1.2 Carrier Acrft Integ 0 0 0 0 0
1.3 Mission Planning 0 0 0 0 0
1.4 Training 0 0 0 0 0
1.5 Peculiar Supp Equip 0 0 0 0 0
1.6 System T & E 0 0 0 0 0
1.7 System Management 0 0 0 0 0
1.8 Data 0 0 0 0 0
1.9 Site Activation 0 0 0 0 0
1.10 Common Supp Equip 0 0 0 0 0
Use the '/' key to display menu selections

Figure 9-4 Data Spreadsheet for Adding the Next Period of Data

Note that the spreadsheet is organized in the same manner as the cumulative to date and at completion portions of the Cost Performance Report (CPR) Format 1 and the Cost/Schedule Status Report. Copies of these report formats are presented in Figures 9-5 and 9-6. The sections are marked on each format for BCWS, BCWP, ACWP, BAC, LRE and Management Reserve. The correspondence between the organization of the formats and the spreadsheet was designed to facilitate the data entry process.

Use the up/down/left/right arrows located in the number pad at the far right of the keyboard to move the cursor from cell to cell around the spreadsheet. Use the Page Up (Pg Up) and Page Down (Pg Dn) keys to move quickly from page to page of the WBS and functional elements. To enter a number, move the cursor to the appropriate cell in the spreadsheet matrix, type the number corresponding to that cell (while you are typing it, this number will appear in the second line of the screen above the matrix), and press <ENTER> to insert the number into the cell.

When entering data into CAPPS, you may use either the number keys across the top row of the keyboard or the number keypad at the far right of the keyboard. The backspace key may be used to delete characters you have already entered in a spreadsheet cell. Pressing the backspace key will delete the character to the left of the cursor. All data should be entered in thousands. If you inadvertently press some of the command or function keys, CAPPS will give you an "unknown command or function" message. An exception to this is the F1 key on the IBM. Pressing it takes you to the Explain screen for Interactive Update. Just press <ENTER> to continue working on the spreadsheet in either case.

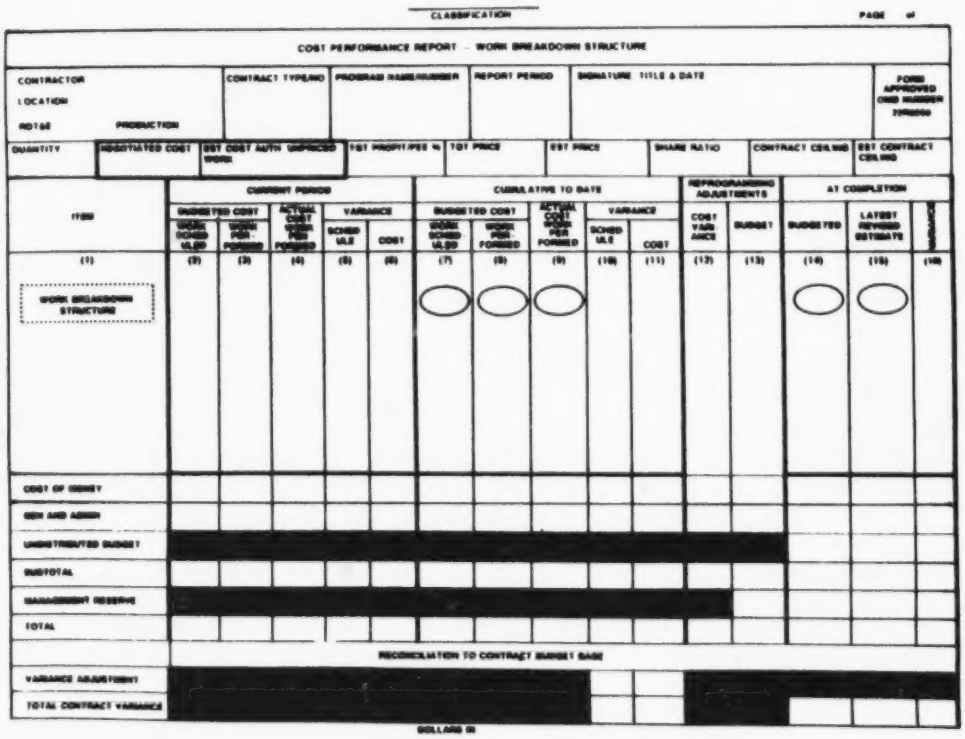


Figure 9-5 CPR Format 1 - Work Breakdown Structure

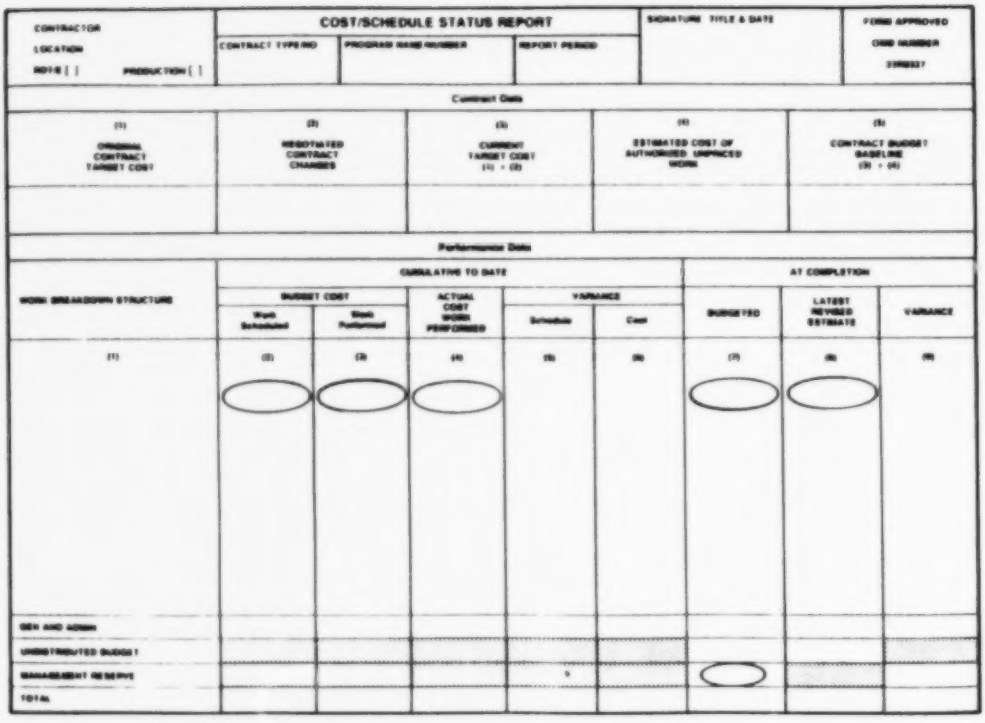
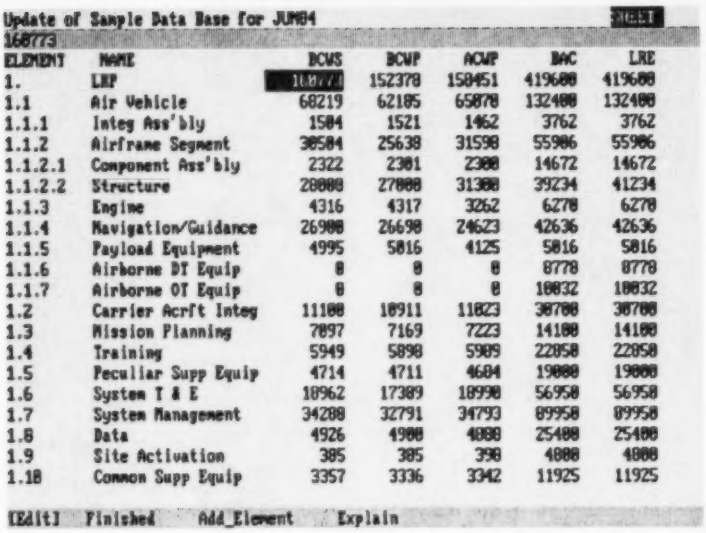


Figure 9-6 Cost/Schedule Status Report

When you have entered data for all WBS or functional elements required, press the slash key "/". This offers you some menu options at the bottom of the spreadsheet screen as shown in Figure 9-7. The options are: Edit, which allows you to reenter the spreadsheet from the menu; Finished, which takes you back to the Interactive Update Menu; Add Element, which lets you add another WBS or functional element to the data base; and, Explain, which takes you to the User Assistance system. To update the data base with the information you have entered, type the letter "F" to move the cursor brackets to the Finished option and press <ENTER> to activate the selection.

The following message will appear: "Updating Data Base - Please Wait" while the data for the new period is being recorded. You will automatically be returned to the Interactive Update Menu.



Update of Sample Data Base for JUN84

168773

ELEMENT	NAME	BCWS	BCWP	ACWP	BAC	LRE
1.	LRF	168773	152378	158451	419600	419600
1.1	Air Vehicle	68219	62185	65878	132400	132400
1.1.1	Integ Ass'bly	1584	1521	1462	3762	3762
1.1.2	Airframe Segment	30584	25638	31598	55986	55986
1.1.2.1	Component Ass'bly	2322	2381	2388	14672	14672
1.1.2.2	Structure	28888	27888	31388	39234	41234
1.1.3	Engine	4316	4317	3262	6278	6278
1.1.4	Navigation/Guidance	26988	26698	24623	42636	42636
1.1.5	Payload Equipment	4995	5816	4125	5816	5816
1.1.6	Airborne DT Equip	8	8	8	8778	8778
1.1.7	Airborne OT Equip	8	8	8	18832	18832
1.2	Carrier Acrft Integ	11188	18911	11823	38788	38788
1.3	Mission Planning	7897	7169	7223	14188	14188
1.4	Training	5949	5898	5989	22858	22858
1.5	Peculiar Supp Equip	4714	4711	4684	19888	19888
1.6	System T & E	18962	17389	18998	56958	56958
1.7	System Management	34288	32791	34793	89958	89958
1.8	Data	4926	4988	4888	25488	25488
1.9	Site Activation	385	385	398	4888	4888
1.18	Common Supp Equip	3357	3336	3342	11925	11925

[Edit] Finished Add_Element Explain

Figure 9-7 Data Spreadsheet with Menu Options and Data

9.2.2 Correct Data for An Existing Period

WHAT TO DO

Choose the "correct data for an existing period" option.

HOW TO DO IT

At the Interactive Update Menu, press the space bar once to bracket the option [Correct] and press <ENTER> to activate the option. The screen will present a listing of what periods of data are already stored and ask you to enter the date of the period for which you wish to correct data. (See Figure 9-8)

Type in the month and year of the period you need to correct and press <ENTER>. A wait message will appear on the screen while the spreadsheet is being initialized. When the spreadsheet appears, correct the data as required.

When you have made the necessary changes, press the slash key "/" to bring up the options at the bottom of the screen. Select the [Finished] option and press <ENTER>. When the data base is finished updating, you will automatically be returned to the Interactive Update Menu.

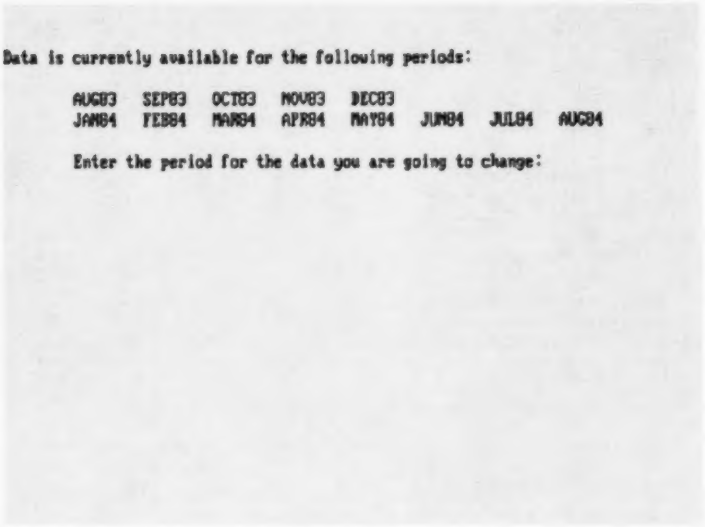

Data is currently available for the following periods:
AUG83 SEP83 OCT83 NOV83 DEC83
JAN84 FEB84 MAR84 APR84 MAY84 JUN84 JUL84 AUG84
Enter the period for the data you are going to change:

Figure 9-8 Choosing a Period for which Data will be Corrected

9.2.3 Remove (Delete) An Existing Element

WHAT TO DO

Choose the "remove (delete) an existing element" option.

HOW TO DO IT

At the Interactive Update Menu, type the letter "R" to move the cursor brackets to the [Remove] option. Press <ENTER> to activate the option. The screen will give you the following prompt:

Enter the number of the element to delete (Return to abort):

If you have decided not to delete, press <ENTER> to abort. (You will have to press <ENTER> twice.) This will move you to the Interactive Update Menu. If you still want to delete, type in the element number, including periods (i.e., 1.2.3.3), and press the <ENTER>. Another prompt appears showing the element name and asking if you are sure that this is the element you wish to delete. If you are, type the letter "Y". You will be returned to the Interactive Update Menu. This deletes the designated element from the data base entirely.

You may inadvertently try to delete a non-existent element. In this case, a message will appear to that effect and you will be asked to press Return. This takes you to the Interactive Update Menu. Double check the element number and try again.

9.2.4 Modify Contract Name or Completion Date

WHAT TO DO

Choose the "modify contract name and add or change the completion date" option.

HOW TO DO IT

At the Interactive Update Menu, type the letter "M" to move the cursor brackets to [Modify] and press <ENTER> to activate the option. The following prompt will appear on the screen:

```
Enter the new contract name (RETURN to
leave as is): Sample Data Base
>>
```

After the >> enter the new name for the contract and press <ENTER>. The following prompt will appear:

```
Enter the new Completion date (RETURN to
leave as is): JUN86
>>
```

After the >> enter the new completion date and press <ENTER>. You will automatically be returned to the Interactive Update Menu.

All WBS and functional elements fall within the boundary established by a single contract completion date. Use the modify option to enter the completion date after you have created a new contract data base (see Section 9.2.5).

9.2.5 Create a New Contract Data Base

WHAT TO DO

Choose the "create a new contract data base" option.

HOW TO DO IT

This option guides you through the process of setting up the contract's work breakdown structure. When all WBS elements and functional elements have been entered, an interactive spreadsheet is set up in which you can enter the data for BCWS, BCWP, ACWP, BAC and LRE. This process replaces whatever is in the WBS.DAT file, the file CAPPS uses for data analysis.

At the Interactive Update Menu, type the letter "N" to move the cursor brackets to the [New] option and press <ENTER> to activate the option. The following screen Prompt will appear:

> NEW DATA BASE CREATION
>
> This will erase the current data base. If you have not copied the data in the data base to a text file using the SAVE function, you will lose the data upon creating a data base.
>
> Do you wish to continue? (Y/N)

Type the letter "Y". The following screen prompt will appear:

> Enter the contract Name...

Type the name of the contract and press <ENTER>. The following screen prompt will appear:

Enter Name of Element 1. .. .

Type the name of Element 1. and press <ENTER>. The following screen prompt will appear:

> Enter Start Date (Example: APR85) ...

Type the start date and press <ENTER>. The following screen prompt will appear:

Is the above information correct? (Y/N)

If you type the letter "Y", the Contract Name, Name of Element 1., and the Start Date will be saved to the WBS.DAT file and the following prompt will appear:

Do you want to add another Element? (Y/N)

Type a "Y" and the following prompt will appear:

Enter Element Number (Example 1.1.2.3):

Type the number of the element and press <ENTER>. (Please see Section 5.4.3. for a discussion of WBS and functional element numbering conventions and restrictions.) At the following prompt, type the corresponding element name:

Enter Name of Element _____

and then:

Enter Start Date (Example: APR85) .. .

If at the following prompt you type the letter "N", the data for the element you have just created is <u>not</u> put into the spreadsheet.

Is the above information correct? (Y/N)

After typing "N" (indicating the information is not correct, do not save it), the following prompt will appear:

Do you want to add another Element? (Y/N)

Type a "Y" and you will be able to insert information for more new elements. If you type the letter "N", indicating you have created all the required elements, the following prompt will appear on the screen:

The WBS (and/or) Functional Elements for a NEW contract have been created. You should now use the interactive spreadsheet to fill in the data.

Press <ENTER> to continue.

Press <ENTER> to go back to the Interactive Update Menu.

There is a final parameter required for creating a new contract data base - the contract completion date. This is entered via the modify option of the Interactive Update Menu. Review Section 9.2.4 for instructions on entering the contract completion date.

You may now begin entering data for your contract. From the Interactive Update Menu, choose the "correct data for an existing period" option by typing the letter "C" and pressing <ENTER>. This will present the dates for which data is available, i.e., the start date you entered for Element 1. Enter the date and press <ENTER>. A spreadsheet will be set up containing Element 1. for your new project in which you can enter data.

Be aware when you are creating a new contract that CAPPS cannot perform analysis with only one element; it needs at least six elements in addition to the total contract Element 1. CAPPS also requires three to four periods of data as was discussed in section 5.4.2.

9.2.6 Return to Utilities

WHAT TO DO

Choose the "return to Utilities" option.

HOW TO DO IT

At the Interactive Update Menu, type the letter "F" to move the cursor brackets to [Finished] and press <ENTER> to activate the option. You will be returned to the Data Base Utilities Menu. From there you have the options of re-entering interactive update, performing a batch update, saving your data, listing your data, returning to Overview, or entering the User Assistance system.

9.2.7 Explain

WHAT TO DO

Choose the "explain" option.

HOW TO DO IT

At the Interactive Update Menu, type the letter "E" to move the cursor brackets to [Explain] and press <ENTER> to activate the option. You will be taken to the Data Base Utilities Explanation Screen shown in Figure 9-9. Select the [Return] option to go back to the Interactive Update Menu.

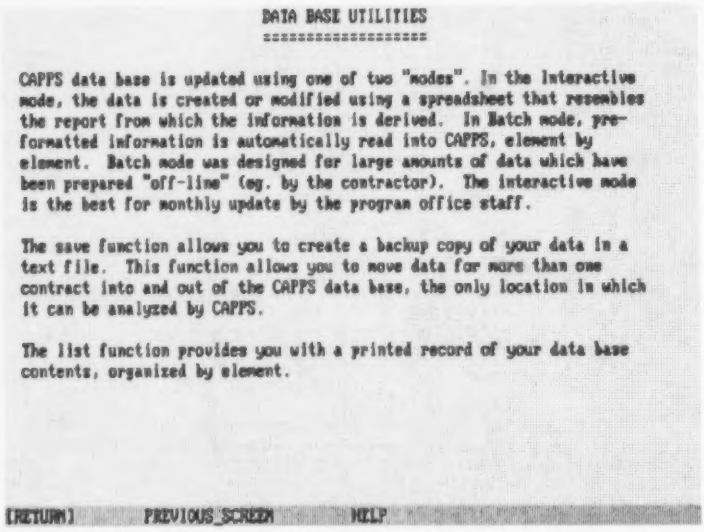

DATA BASE UTILITIES
CAPPS data base is updated using one of two "modes". In the interactive mode, the data is created or modified using a spreadsheet that resembles the report from which the information is derived. In Batch mode, pre-formatted information is automatically read into CAPPS, element by element. Batch mode was designed for large amounts of data which have been prepared "off-line" (eg. by the contractor). The interactive mode is the best for monthly update by the program office staff.
The save function allows you to create a backup copy of your data in a text file. This function allows you to move data for more than one contract into and out of the CAPPS data base, the only location in which it can be analyzed by CAPPS.
The list function provides you with a printed record of your data base contents, organized by element.
[RETURN] PREVIOUS SCREEN HELP

Figure 9-9 Data Base Utilities Explanation Screen

9.3 Discussion of Interactive versus Batch Update

You can operate CAPPS using the Interactive Update process exclusively. You will not want to use another CAPPS update process if you are monitoring data for a single contract. However, if you are tracking a variety of contracts you will need to ensure that the data base for a specific

contract is in the WBS.DAT file when you are ready to perform analysis of that contract.

To accomplish this, use the Batch and Save functions to enter data into the WBS.DAT file and to move data into designated text files. Prepare a separate floppy disk or file on the hard disk for each contract you monitor. Each file will hold the unique data for a single contract.

A short discussion of how CAPPS works with data will help you understand the differences between the WBS.DAT file and _ _ _ .txt files. In Figure 9-10, the CAPPS program is presented as a rectangle containing, among other things, a WBS.DAT file and the Interactive Update function. Outside of CAPPS are some _ _ _ .txt files and an editor. These text files are moved into and out of the WBS.DAT file using the Batch and Save functions. When data is entered via Interactive Update, the WBS.DAT file is altered. The text file, however, is not altered by Interactive Update. To alter an existing text file, you can either use the Save function to move data from the WBS.DAT file to the text file or use an editor such as EDLIN to make changes outside of the CAPPS program.

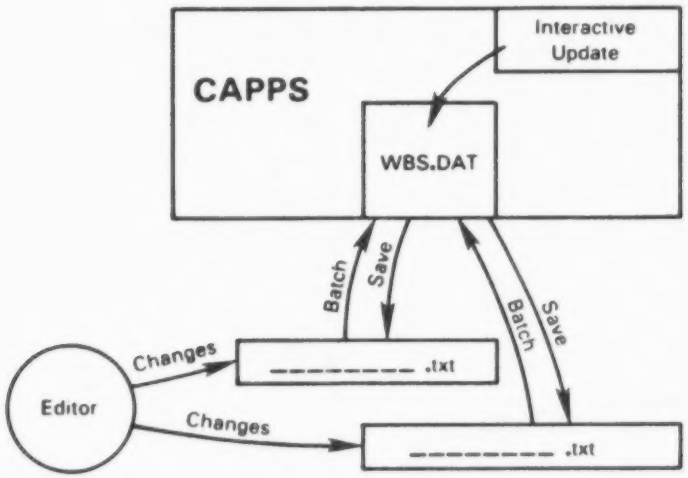


Figure 9-10 File Concept

The following chart presents the methods by which creation and change of these files occurs and distinguishes between files which can be analyzed by CAPPS and those which cannot.

File Type	To Create	To Change	To analyze
WBS.DAT	•Interactive update •Batch	•Interactive update •Batch	•Use CAPPS Analysis
---.txt	•Editor •Save	•Editor •Save	•Analysis Impossible

Regardless of how the data gets there, CAPPS uses only the WBS.DAT file for analysis purposes.

Assume you monitor two contracts. If the data for the first contract has been stored in a text file, you can simply Batch load the text file into CAPPS and perform analysis. If, after analyzing that contract, you want to analyze the second contract for which you also have data in a text file, simply Batch load the second text file into CAPPS. This replaces the information in the WBS.DAT file, leaving both text files intact.

If you change an existing data base or create a new contract using Interactive Update and want the new pieces of data to be saved in a text file, use the Save function to translate the data in WBS.DAT to the appropriate text file. In the first case, changes to an existing data base, the text file will already exist; you simply save over it. In the second case, creation of a new contract, you have to name a new text file to contain your data.

9.4 Batch Update

WHAT TO DO

Choose the "data base update using batch mode entry" option.

HOW TO DO IT

At the Data Base Utilities Menu, type the letter "B" to move the cursor brackets to [Batch] and press <ENTER> to activate the option. The following screen prompt will appear:

Batch update will destroy all data currently in the data base. If you wish to keep a copy of the data now being analyzed, it must be stored in a text file (using the SAVE function) before you batch update.

Ready to batch update? (Y/N)

Type the letter "Y" and the screen prompts you to:

Enter file name:

Type the name of the text file you have created for your data including the .txt extension and press <ENTER>. Your data will be loaded into the WBS.DAT file. As it loads, WBS and functional elements which are being loaded scroll sequentially on the screen. When finished loading, the message:

End of input found

will appear and you will automatically be returned to the Data Base Utilities Menu. This data is now in the WBS.DAT file, the only file which CAPPS uses for analysis.

During the process of reading the data in, a bad data message may appear on the screen. CAPPS will normally just pass on to the next item of data, but this may create problems later when you try to run the graphics. If you get a bad data message, go into the text file using the editor and make the necessary corrections (see Figures 9-11 and 9-12). If you decide to ignore the bad data warning and proceed without correcting the text file, be aware that the validity of CAPPS analysis has been compromised.

As was discussed earlier in Section 9.3, there are two ways to put data into the WBS.DAT file. One is by Interactive Update using the data spreadsheet; the other is by Batch loading from a .txt file. If you want to load more than a few months of data at a time, the Batch mode is faster but there is a special format which must be used to create a .txt file.

Using any word processor or text editor (such as EDLIN) prepare your data in the format illustrated in Figure 9-11. If you use a word processor to create a text file, make sure that you use the option that does not contain the word processor's unique control codes.

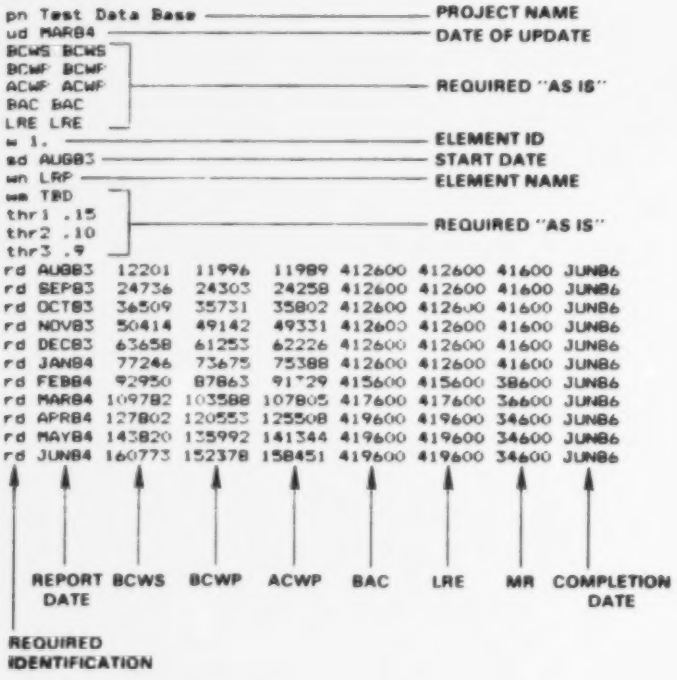


Figure 9-11 Text File Format

For a file with multiple elements prepare your data as in Figure 9-12. Each new element, preceded by the letter "W", simply follows the data entered for the element above it. As many month rows preceded by "rd" as are required may be used.

```
pn Test Data Base
ud MAR84
BCWS BCWS
BCWP BCWP
ACWP ACWP
BAC BAC
LRE LRE
w 1.
sd AUG83
wn LRP
wm TBD
thr1 .15
thr2 .10
thr3 .9
rd AUG83  12201  11996  11989 412600 412600 41600 JUN86
rd SEP83  24736  24303  24258 412600 412600 41600 JUN86
rd OCT83  36509  35731  35802 412600 412600 41600 JUN86
rd NOV83  50414  49142  49331 412600 412600 41600 JUN86
rd DEC83  63658  61253  62226 412600 412600 41600 JUN86
rd JAN84  77246  73675  75388 412600 412600 41600 JUN86
rd FEB84  92950  87863  91329 415600 415600 38600 JUN86
rd MAR84 109782 103588 107805 417600 417600 36600 JUN86
rd APR84 127802 120553 125508 419600 419600 34600 JUN86
rd MAY84 143820 135992 141344 419600 419600 34600 JUN86
rd JUN84 160773 152378 158451 419600 419600 34600 JUN86
w 1.1
sd AUG83
wn Air Vehicle
wm TBD
thr1 .15
thr2 .10
thr3 .9
rd AUG83   4580   4473   4455 125400 125400     0 JUN86
rd SEP83   9201   8989   8945 125400 125400     0 JUN86
rd OCT83  13907  13479  13528 125400 125400     0 JUN86
rd NOV83  19613  18855  18887 125400 125400     0 JUN86
rd DEC83  24889  23541  23771 125400 125400     0 JUN86
rd JAN84  30204  28010  28701 125400 125400     0 JUN86
rd FEB84  38707  35346  37316 128400 128400     0 JUN86
rd MAR84  46508  42441  44594 130400 130400     0 JUN86
rd APR84  54805  50095  52269 132400 132400     0 JUN86
rd MAY84  61225  56403  58230 132400 132400     0 JUN86
rd JUN84  68219  62185  65070 132400 132400     0 JUN86
```

CONTRACT DATA

1st ELEMENT

2nd ELEMENT

Figure 9-12 Text File Format with Multiple Elements

9.5 Data Base Save

WHAT TO DO

Choose the "data base save for back-up purposes" option.

HOW TO DO IT

At the Data Base Utilities Menu, type the letter "S" to move the cursor brackets to Save and press <ENTER> to activate the option. The following screen prompt will appear:

Enter Save file name:

Type the name of the existing text file you want to overwrite or the name of the text file you wish to create in the following format (up to an eight- character name) :

_ _ _.txt

and press <ENTER>. If the file you wish to save already exists, the following message appears:

File already exists. Overwrite? (Y/N)

If you wish to overwrite, type the letter "Y". The save operation will be executed and you will be returned to the Data Base Utilities Menu.

If you do not wish to overwrite the existing file, type the letter "N" and the following message will appear:

Save aborted. (Hit CR to continue)

Pressing <ENTER> will take you back to the Data Base Utilities Menu.

If you are saving data to a new text file, the save operation will be executed after you type in the file name and press <ENTER>. After the data is saved, you will be returned to the Data Base Utilities Menu.

The save operation moves information from the WBS.DAT file to the designated text file. The WBS.DAT file remains intact during this process.

9.6 Data Base List

WHAT TO DO

Choose the "data base hardcopy list" option.

HOW TO DO IT

At the Data Base Utilities Menu, type the letter "L" to move the cursor brackets to List and press <ENTER> to activate the selection. The following screen message will appear:

> The list function will list the data base on your printer. An interrupt while printing may destroy your data, so allow plenty of time to print!
>
> Ready to Print? (Y/N)

If you choose "yes," be certain that you allow sufficient time for the printing process to be completed since the entire data base will be printed regardless of size. An interrupt during printing may cause a loss of data. Make sure your printer is on!

To list the data, type the letter "Y". The data will be printed and you will be returned to the Data Base Utilities Menu. If you do not wish to list the data base at this time, type the letter "N." You will be returned to the Data Base Utilities Menu.

9.7 Return to Overview

WHAT TO DO

Choose the "return to overview" option.

HOW TO DO IT

At the Data Base Utilities Menu, type the letter "0" to move the cursor brackets to the [Overview] option and press <ENTER> to activate the option. The following message will appear on the screen:

> Analyzing Data Base - Please Stand By and you will be returned to the Overview Screen.

9.8 Explain

WHAT TO DO

Choose the "explain" option.

HOW TO DO IT

At the Data Base Utilities Menu, type the letter "E" to move the cursor brackets to the [Explain] option and press <ENTER> to activate the option. You will be taken to the Data Base Utilities Explanation Screen, as shown in Figure 9-13.

DATA BASE UTILITIES
CAPPS data base is updated using one of two "modes". In the Interactive mode, the data is created or modified using a spreadsheet that resembles the report from which the information is derived. In Batch mode, pre-formatted information is automatically read into CAPPS, element by element. Batch mode was designed for large amounts of data which have been prepared "off-line" (eg. by the contractor). The interactive mode is the best for monthly update by the program office staff.
The save function allows you to create a backup copy of your data in a text file. This function allows you to move data for more than one contract into and out of the CAPPS data base, the only location in which it can be analyzed by CAPPS.
The list function provides you with a printed record of your data base contents, organized by element.
[RETURN] PREVIOUS_SCREEN HELP

Figure 9-13 Data Base Utilities Explanation Screen

APPENDIX A

Rules for Status Screen Comments

The "comments" presented in this Appendix are based on logic incorporated in the CAPPS program for evaluating data relationships. Not all possible comments have been included. Comments based on fact, using raw performance data such as statements of what percent complete an effort is or what amount is being expended per month, have been excluded from this Appendix.

A.1 Cost Comments

There has been a significant increase in the rate of expenditures recently.

1. Last month's ACWP must be greater than two months ago
2. There must be a 20% increase in rate of ACWP change from last month to this month

There has been a significant decrease in the rate of expenditures recently.

1. ACWP for current month/ACWP for prior month must be less than .8

Performance is not good!

1. Cost Variance Percent must be less than zero
2. CPI must be less than .8

In fact, it looks like things are going dramatically bad!

1. Cost Variance Percent must be less than zero
2. CPI must be less than .8
3. CPI this month/CPI last month must be less than .8

In fact, there are STRONG indications that things are getting worse!

1. Cost Variance Percent must be less than zero
2. Cost Variance must be getting worse
3. CPI must be getting worse
4. SPI must be getting worse

In fact, problems seem to be continuing.

1. Cost Variance Percent must be less than zero
2. CPI must be less than .8
3. Prior CPI must be between .78 and .82

There are indications that you've got problems developing.

1. Cost Variance Percent must be less than zero
2. CPI must be less than .8
3. Prior month CV/this month CV must be less than .9
4. Difference between CV'S must be increasing

Fortunately, things have improved within the last month.

1. Cost Variance Percent must be less than zero
2. CPI must be less than .8
3. This month CPI/last month CPI must be greater than 1.2

This improvement may be superficial based on management reserve use, however.

1. Cost Variance Percent must be less than zero
2. CPI must be less than .8

3. This month CPI/last month CPI must be greater than 1.2

4. Management Reserve must decrease by a value greater than the improvement in cost variance

5. BAC must increase as much or more than the cost variance

It appears that things are improving slightly, however.

1. Cost Variance Percent must be less than zero

2. CPI must be less than .8

3. This month CPI/last month CPI must be greater than 1.05

Beware, however, it looks like things are going to heck!

1. Cost Variance Percent must be greater than zero

2. This month CPI/last month CPI must be less than .7

There are signs that things are degrading.

1. Cost Variance Percent must be greater than zero

2. This month CPI/last month CPI must be less than .85

In fact, things are improving slightly.

1. Cost Variance Percent must be greater than zero

2. This month CFI/last month CPI must be greater than 1.05

This element is right on cost.

1. Cost Variance Percent must be zero

A.2 Schedule Comments

You have an early schedule variance which is a key indicator of future cost growth!

1. Percent Complete (BCWP/BAC) must be less than 15% and the SPI must be less than .9

At current performance, this will slip the schedule about _____ weeks.

1. Element must be between 20 and 70 percent complete
2. Schedule variance must be negative
3. Calculation is as follows:

$$\left[\left(\frac{SV}{\text{cur BCWP}} \times 4.3\right) \times (-1)\right]$$

4. .5 is added to the result for rounding and the integer value of the resulting number appears on the screen

A.3 At Completion Comments

The contractor is projecting that this effort will complete on cost. But this is virtually impossible based on current status.

1. BAC must equal LRE
2. Index to go/CPI must be greater than 1.2

The contractor is projecting that this effort will complete on cost. But based on how things are going, this will be very difficult.

1. BAC must equal LRE
2. Index to go/CPI must be greater than 1.05

The contractor is projecting that this effort will underrun. But this is virtually impossible based on current status.

1. BAC must be greater than LRE

2. Index to go/CPI must be greater than 1.2

The contractor is projecting that this effort will underrun. But based on how things are going, this will be very difficult.

1. BAC must be greater than LRE

2. Index to go/CPI must be greater than 1.05

The contractor's estimate at completion is overly optimistic based on performance to date.

1. BAC must be less than LRE

2. Index to go/CPI must be greater than 1.25

The contractor's estimate at completion appears pessimistic based on performance to date.

1. BAC must be less than LRE

2. Index to go/CPI must be less than .7

A.4 Management Reserve Comments

A significant amount of management reserve was allocated this period.

1. Prior management reserve must be greater than current management reserve x 1.15

A.5 Miscellaneous Comments

There is a problem with the data.

1. BCWS or BCWP is greater than BAC

There has been a significant increase in the budget this period.

1. Current BAC/Prior BAC must be greater than 1.4

Beware of problems in this element; the budget has been increasing routinely.

1. There must be more than four months of data
2. The number of times the BAC increased/the total number of periods must be greater than .8
3. There must be a BAC increase this period

There has been a significant increase in the contractor's estimate this period.

1. Current LRE/Prior LRE must be greater than 1.4

APPENDIX B

Guide to User Assistance Topics

The User Assistance function is made up of two distinct parts, Explain and Help. The Explain system provides information about performance measurement techniques and terminology. The Help system covers some aspects of hardware and software operation while using CAPPS. The Explain system must be accessed from either the Analysis or Update function. When you access the Help system from either of them or by typing a "?" you begin automatically at the Main Help Menu. Topics available in each system are listed below.

Help Topics:
- Module Structure
- Module Flow
- Keypad
- Files
- Hardcopy
- Graphics
- Commands
- Help Explanation

Explain Topics:
- Overview Screen Explanation
- Contact Status Screen Explanation
- Key Element Status Screen Explanation
- Cumulative Performance Graph Explanation
- Variance Trends Graph Explanation
- Cost Performance Indices Graph Explanation
- Projected Completion Status Graph Explanation

Short Definitions :
- BCWS
- BCWP
- ACWP
- BAC
- LRE

Long Definitions :

- BCWS
- BCWP
- ACWP
- BAC
- LRE
- Management Reserve

Computations :

- Cost Variance
- Schedule Variance
- Variance at Completion
- Cost Variance Percent
- Cost Performance Index
- Index to Go
- EAC Techniques
- EAC Formulas

Help

Data Base Utilities

APPENDIX C

Performance Measurement References

Cost/Schedule Management of Non-Major Contracts (C/SSR Joint Guide) DARCOM-P 715-13, NAVMAT P5244, AFLCP 173-2, AFSCP 173-3 DLAH 8315.3, 1 November 1978, Navy Publications E Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

Guide to Analysis of Contractor Cost Data, 1 June 1977, HQ AFSC/ACC, Andrews Air Force Base, Camp Springs, MD 20331.

Joint Implementation Guide AFSCP 173-5, AFLCP 173-5; DARCOM-P 715-5 NAVMAT P5240, DLAH 8315 .2, October 1, 1980, Navy Publications & Forms Center, 5801 Tabor Avenue, Philadelphia PA 19120.

Joint Surveillance Guide AFSCP 173-6, AFLCP 173-6, AMCP 715-10, NAVMAT P5243, DSAH 8315.1, DCAAP 7641.46, 1 July, 1974, Letterkenny Army Depot/AMXLE-AID, Chambersburg, PA 17201.

MIL-STD-881A, "Work Breakdown Structures for Defense Materiel Items", 25 April 1975, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

APPENDIX D

Error Routines

CAPPS routinely checks your data during the input process for small errors such as misspelled dates. When CAPPS encounters more serious data problems, it will usually try to ignore them and go on executing the next step of the program. As was discussed in the section on batch update, you should go into the text file to correct data problems of which you are aware to prevent complications during analysis and graphics.

One basic data problem is the lack of data. CAPPS must have sufficient logical data to perform analysis. Trying to run the program with bad (i.e., ACWP = 0 when calculating a CPI) or nonexistent data will cause internal errors which throw you out of the CAPPS program. For this reason, wait until you have three months of data before you begin using CAPPS for analysis.

APPENDIX E

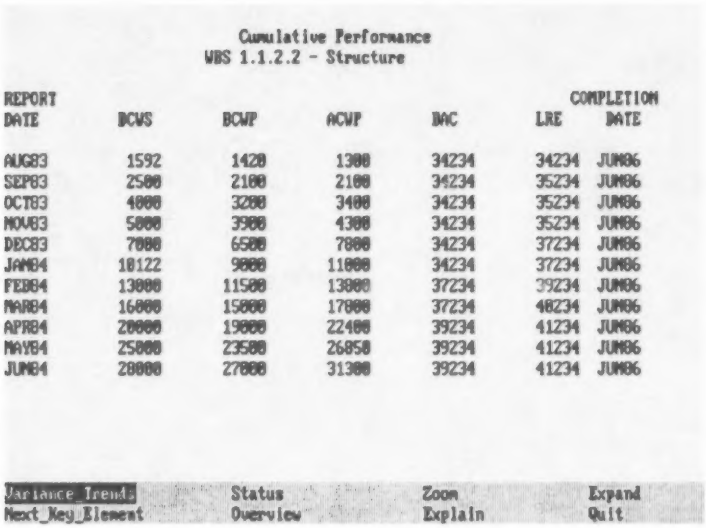
Tabular CAPPS

Version 2.00 and later versions of CAPPS include an option which permits users without a graphics capability to make use of CAPPS' analytical and managerial analysis routines. All screens which would normally yield graphics have been converted to present values in table form.

To invoke tabular CAPPS version follow the installation instructions in Section 5 and start the program in accordance with subsection 5.5 (type: CAPPS -T).

Some of the screen prompts which relate to the graphics version such as "EXPAND" and "ZOOM" have been left in the menu selections. They have no effect when running the tabular version.

Figures E-1 through E-5 show the tabular version of the five graphs: Cumulative Performance; Variance Trends; Cost Performance Indices; Estimates at Completion; and Key Element Status. The selection option from the key element status screen permits you to select the element marked with an "*," or enter your choice. You have the option to view all elements or lower level elements only, as in the graphics version, by pressing "ESC" instead of selecting an element or [CR].

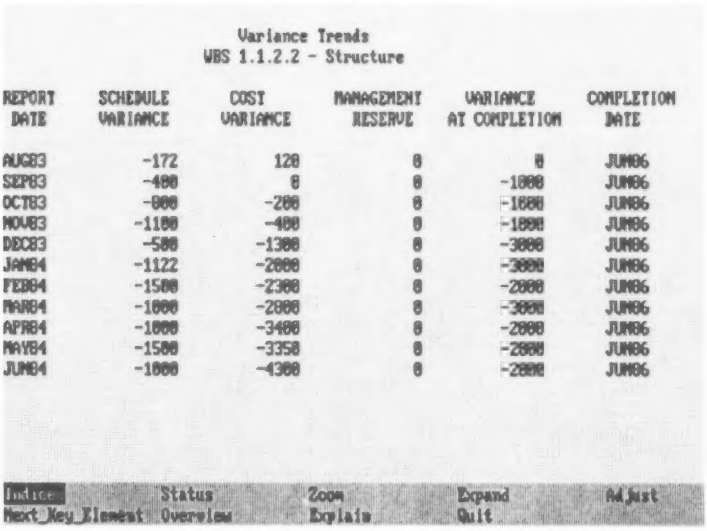


Cumulative Performance
WBS 1.1.2.2 - Structure

REPORT DATE	BCWS	BCWP	ACWP	BAC	LRE	COMPLETION DATE
AUG83	1592	1420	1300	34234	34234	JUN86
SEP83	2500	2100	2100	34234	35234	JUN86
OCT83	4000	3200	3400	34234	35234	JUN86
NOV83	5000	3900	4300	34234	35234	JUN86
DEC83	7000	6500	7000	34234	37234	JUN86
JAN84	10122	9000	11000	34234	37234	JUN86
FEB84	13000	11500	13000	37234	39234	JUN86
MAR84	16000	15000	17000	37234	40234	JUN86
APR84	20000	19000	22400	39234	41234	JUN86
MAY84	25000	23500	26850	39234	41234	JUN86
JUN84	28000	27000	31300	39234	41234	JUN86

Variance Trends | Status | Zoom | Expand
Next_Key_Element | Overview | Explain | Quit

Figure E-1. Cumulative Performance



Variance Trends
WBS 1.1.2.2 - Structure

REPORT DATE	SCHEDULE VARIANCE	COST VARIANCE	MANAGEMENT RESERVE	VARIANCE AT COMPLETION	COMPLETION DATE
AUG83	-172	120	0	0	JUN86
SEP83	-400	0	0	-1000	JUN86
OCT83	-800	-200	0	-1600	JUN86
NOV83	-1100	-400	0	-1800	JUN86
DEC83	-500	-1300	0	-3000	JUN86
JAN84	-1122	-2000	0	-3000	JUN86
FEB84	-1500	-2300	0	-2000	JUN86
MAR84	-1000	-2000	0	-3000	JUN86
APR84	-1000	-3400	0	-2000	JUN86
MAY84	-1500	-3350	0	-2000	JUN86
JUN84	-1000	-4300	0	-2000	JUN86

Indices | Status | Zoom | Expand | Adjust
Next_Key_Element | Overview | Explain | Quit

Figure E-2. Variance Trends

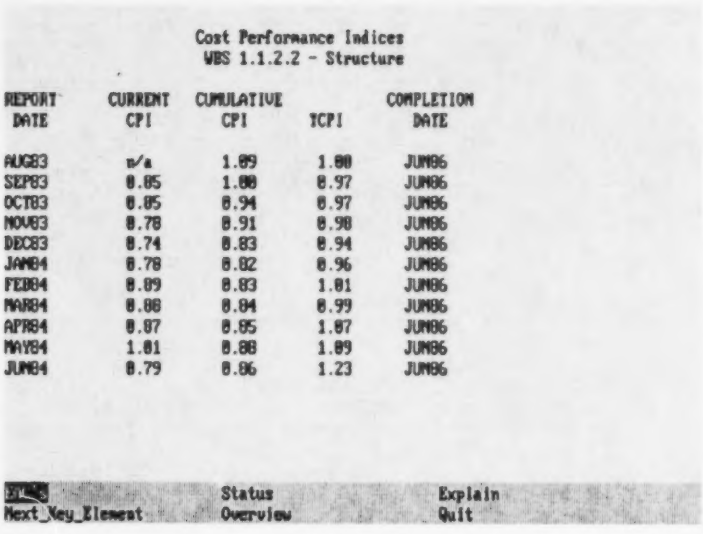


Figure E-3. Cost Performance Indices

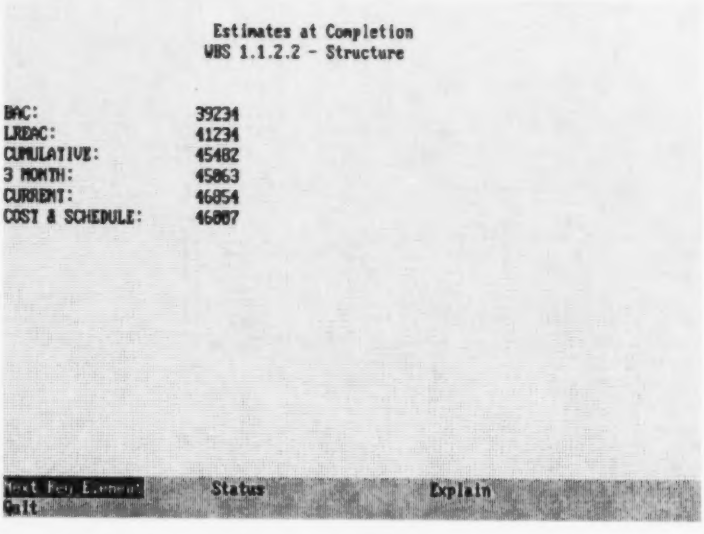
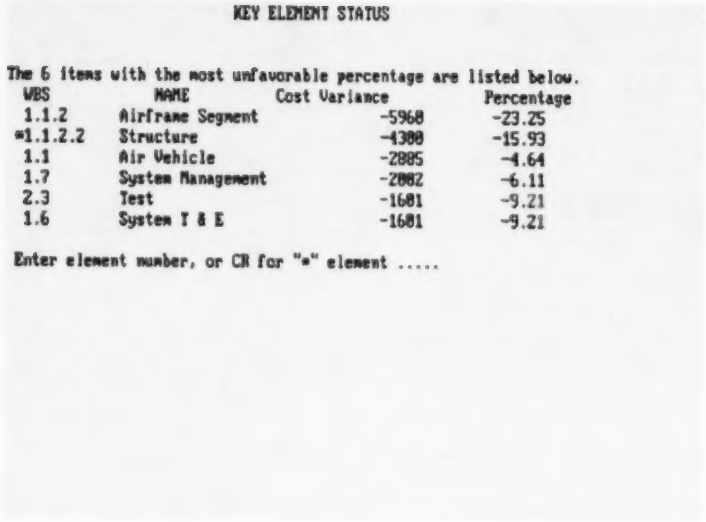


Figure E-4. Estimates at Completion



KEY ELEMENT STATUS

The 6 items with the most unfavorable percentage are listed below.

WBS	NAME	Cost Variance	Percentage
1.1.2	Airframe Segment	-5960	-23.25
*1.1.2.2	Structure	-4300	-15.93
1.1	Air Vehicle	-2885	-4.64
1.7	System Management	-2002	-6.11
2.3	Test	-1601	-9.21
1.6	System I & E	-1601	-9.21

Enter element number, or CR for "*" element .....

Figure E-5. Key Elements Status

APPENDIX F

Automated Data Submission

In the event the user desires to obtain CAPPS data on a 5-1/4" floppy disk, the following instruction may be inserted in block 16 of the CPR Data Item Description (DID) DI-F-6000C, or C/SSR DI-F-6010A sequence number on the DD Form 1423, Contract Data Requirements List (CDRL). Copies of Figures F-l and F-2 must also be attached to the CDRL. Be sure to verify the effective version of the above referenced DIDs.

Data will be submitted, in the format below, on 5-1/4" double sided, double density floppy diskettes formatted under PC-DOS or MS-DOS. Data will be prepared using either a text editor or a word processor, without invoking a word processor's unique control codes.

Figure F-1 attached illustrates the text file format for contract data with clear identification of the format for each specific data item.

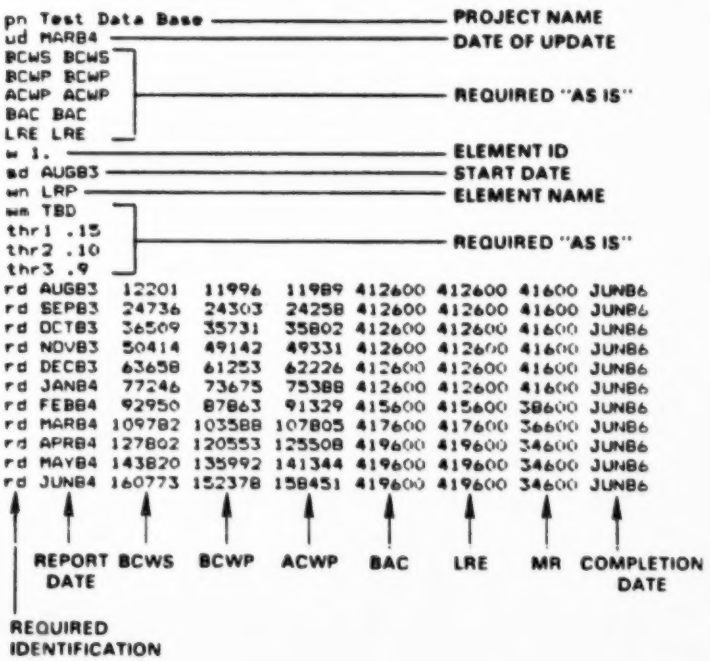


Figure F-1. Text File Format

Figure F-2 attached illustrates the text file format for contract data and multiple WBS or functional elements. Each new element, preceded by the letter "w"; follows the data entered for the element above it. The letters "rd" precede each monthly row of data.

WBS elements are numbered beginning with "1". Functional elements are numbered beginning with "2". Note that element 1. is the total contract, and the only element where management reserve appears.

```
pn Test Data Base
ud MAR84
BCWS BCWS
BCWP BCWP
ACWP ACWP
BAC BAC
LRE LRE
w 1.
sd AUG83
wn LRP
wm TBD
thr1 .15
thr2 .10
thr3 .9
rd AUG83   12201   11996   11989 412600 412600 41600 JUN86
rd SEP83   24736   24303   24258 412600 412600 41600 JUN86
rd OCT83   36509   35731   35802 412600 412600 41600 JUN86
rd NOV83   50414   49142   49331 412600 412600 41600 JUN86
rd DEC83   63658   61253   62226 412600 412600 41600 JUN86
rd JAN84   77246   73675   75388 412600 412600 41600 JUN86
rd FEB84   92950   87863   91329 415600 415600 38600 JUN86
rd MAR84  109782  103588  107805 417600 417600 36600 JUN86
rd APR84  127802  120553  125508 419600 419600 34600 JUN86
rd MAY84  143820  135992  141344 419600 419600 34600 JUN86
rd JUN84  160773  152378  158451 419600 419600 34600 JUN86
w 1.1
sd AUG83
wn Air Vehicle
wm TBD
thr1 .15
thr2 .10
thr3 .9
rd AUG83    4580    4473    4455 125400 125400     0 JUN86
rd SEP83    9201    8989    8945 125400 125400     0 JUN86
rd OCT83   13907   13479   13528 125400 125400     0 JUN86
rd NOV83   19613   18855   18887 125400 125400     0 JUN86
rd DEC83   24889   23541   23771 125400 125400     0 JUN86
rd JAN84   30204   28010   28701 125400 125400     0 JUN86
rd FEB84   38707   35346   37316 128400 128400     0 JUN86
rd MAR84   46508   42441   44594 130400 130400     0 JUN86
rd APR84   54805   50095   52269 132400 132400     0 JUN86
rd MAY84   61225   56403   58230 132400 132400     0 JUN86
rd JUN84   68219   62185   65070 132400 132400     0 JUN86
```

CONTRACT DATA

1st ELEMENT

2nd ELEMENT

Figure F-2 Text File Format with Multiple Elements